VOLUME LXV APRIL, 1909 No. 4

AMERICAN
JOURNAL OF INSANITY

A CLINICAL STUDY WITH BLOOD EXAMINATIONS OF TWO ATYPICAL CASES RELATED TO THE DEMENTIA PRECOX GROUP.

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That the study of the blood of the insane has provided an attractive field for research during the past half century or more, may easily be determined by a casual glance over the literature accumulated during that time. Because of the inaccuracy of the methods known to the older workers, not much value can be placed on the results which they obtained. With the advances made in the clinical methods for examining the blood, there has been a coincident gain in a more accurate knowledge of the hematologic changes which occur, both in healthy and diseased states, so much so that a blood examination in certain maladies is essential to verify the diagnosis. Could it not reasonably be expected that in psychiatric medicine there might be some characteristic divergences from the normal in the blood picture? The older, and also some of the recent investigators in this field, concur in the opinion that there is in general, some deterioration, a mild secondary anemia, present in most cases. This, however, cannot be said to be characteristic of any one psychosis or of the psychoses as a whole, but is more probably the direct result of the mode of life among the insane, as was pointed out by Lindsay more than fifty years ago. More recent studies have apparently shown that undoubted changes occur in the number of leucocytes, and some observers, of which class Bruce is perhaps the foremost exponent, believe that factors of diagnostic importance can be ascertained from an estimation of the number of white blood cells.

Further work is needed to fully substantiate these views. At the present time, it seems that such conclusions push the pendulum to its widest excursion and at a rate which, later on, it may be found necessary to retard.

Not only has the morphology of the blood been investigated, but considerable time and energy have been expended in studying other points—the specific gravity, tonicity, reaction, viscosity, and the detection of the presence or absence of abnormal constituents, particularly the existence of toxins or other deleterious substances of a similar nature. Factors known to affect the condition of the blood, such as muscular exercise, nourishment, temperature and blood pressure variations, have all received more or less careful attention, and have resulted in findings which are fairly uniform.

It is only within comparatively recent years that sufficiently carefully-controlled observations extending over a considerable period of time have been carried out. A vast majority of the papers relating to the condition of the blood in the various psychoses, report the results of examinations in a great many cases which were not, however, studied for any length of time; indeed, in many cases, not more than one or two examinations in all were made. And again, many writers have attempted to bring the results of their blood examinations into accord with the various clinical types of mental disease, without particular regard to the exact condition of the patient at the time of the examination.

Thinking that frequently repeated examinations of the blood in a few selected cases, continued over a long period of time, might be of some value, this work was undertaken in the fall of 1907. It was decided to study, at first, only such cases in which the symptom of stupor supervened, disregarding, for the time being, the character of the underlying psychosis.

Almost at the beginning of this work, the two cases here presented, were found to possess such similarities, and on the other hand, to differ so widely from the ordinary type, that they have been reported together.

As within a period of ten years or more, a vast amount of data concerning these patients has been accumulated, the histories will first be given, and then the consideration of the results of the blood examination, in connection with the clinical conditions existing, will be taken up.

CASE I.—No. 541, male, age 46.

Anamnesis.—A maternal great-aunt suffered with some mental trouble, the nature of which is unascertainable. There was a distant blood relationship between the father and mother. One brother and one sister are characterized as "neurotic," and one sister developed a psychosis from which she did not recover; otherwise, the history is unimportant. No alcoholic or drug addictions. The mother was 27 years old when he was born, the fifth of ten children. As a child he had some mild convulsive attacks, and in boyhood, there was a trifling head trauma. Puberal epoch was uneventful. He attended school until fifteen and is said to have done average work, but to have been more inclined toward games and amusements than toward study. After leaving school, and until the onset of present illness, he was employed in various clerical positions, always rendering efficient and satisfactory services and exhibiting ambition and diligence. There is no luetic history.

The first mental attack occurred about 1890, when he was twenty-eight or nine years old. The first symptoms appeared abruptly; some suspiciousness and ideas of reference of a mild persecutory nature, coincident with motor-restlessness; and later, seclusiveness and reticence. Psychomotor activity gradually increased, developing into a condition of turbulent excitement, throughout which was noted a tendency towards posing and attitudinizing. No suicidal or homicidal tendencies were exhibited. After about a month, he was considered "almost well."

The next attack, which was similar to the first, occurred at the time of his mother's death some six or eight months later. There were no further attacks until 1894, when he was first admitted to this hospital, then in the midst of an excited attack which had begun three weeks previous. For another month, excitement continued. There were marked psychomotor activity, incoherent and disconnected rambling logorrhea, inaccessibility and irrelevancy; also suspiciousness and mild delusions of a persecutory nature. These symptoms gradually disappeared, and he was discharged improved. From this time until 1897, when re-admitted, he passed through two or three similar attacks. During this time his disposition underwent a marked change and he became irritable, complaining and domineering. This attack lasted several months, when he was again taken home where he remained idle, inactive and indifferent; when, becoming excited, he was re-admitted to the hospital in 1898, where he has since remained.

1900.—Since his last admission, the attacks have become more frequent and of shorter duration. At the onset, there is noted motor-restlessness, insomnia, irritability, inaccessibility and irrelevance. The excitement rapidly reaches its height, and auditory and visual hallucinations are present. During this time he is careless in person and habits. The attacks average now, from five to six weeks in duration. The only change is the appearance recently, of short periods of mutism, posing, etc., in an otherwise excited day.

1902.—During the past two years, the attacks have become even more frequent and of still shorter duration. Excitement begins the attacks as formerly, but lasts now only from one to three weeks, when it is replaced by a short, stuporous period from which he emerges into his "normal" condition. Excitement is the most prominent feature of the attacks, although stupor is becoming more pronounced both in intensity and duration.

1904.—At the onset of his attacks, there is a marked tendency toward talkativeness, with some distractibility and complete irrelevancy in answers, frequently singing or chanting his replies, and often rhyming. Distractibility and accessibility become less noticeable, even to a self-centered inaccessibility. Words heard are interpolated into his continuous logorrhea. There is some resistance to passive motion; a coarse volitional tremor, and at times, negativism, are present. When "well," he denies his illness, but admits that he used to have attacks of "nervousness." His insight is partial, judgment poor; mental deterioration is not marked. Physically, he continues in excellent health.

1906.—Within the past two years, the attacks have begun with less noise and turbulence. The initial logorrhea is still present but is much milder. Soon, the former excitement appears and after several days, gradually subsides into a depression of a few days' duration, from which he passes into his "normal" condition. During the past summer while "well," he has been unusually drowsy and disinterested in his usual pursuits. Since September, his attacks frequently begin with a mute, stuporous period which lasts but a short time, and this is replaced by a period of excitement from which, however, the motor element has almost completely disappeared. During this excitement he is, to a degree, inaccessible, distractible, and irrelevant. His continuous logorrhea is without order or sequence in association or reasoning. With the abatement of the excitement, stupor, together with mutism and resistiveness appear, and in turn, these symptoms gradually vanish as the patient approaches "normal." This stuporous phase is now fully as prominent as the excitement, both in its depth and duration.

1908.—The most noticeable change is the increasing prominence of the stuporous element, this now constituting almost the entire abnormal phase.

Present Condition.—On reviewing the condition for the past year, one finds that the changes which have taken place have been those of detail only. As a general rule, the patient exhibits no prodromal signs by which the beginning of an "abnormal" period can be detected. Occasionally for a period of from 24 to 48 hours, he may appear drowsy and disinterested in his usual pastimes. The onset may occur in either one of two ways: after a night's undisturbed sleep, he may awake mute and resistive; later in the day this mutism may be interrupted by a psychic elevation with marked logorrhea, irrelevancy in answers and inaccessibility, with slight distractibility, which condition, however, is soon replaced by the former one of mutism and resistiveness. The most common onset is that with mild excitement which persists for several hours and is replaced by a mute, re-

sistive phase. During the excited phase he is quite inaccessible; attention is poor or wanting and there is but little distractibility or divertibility; association is rapid but imperfect. Occasionally one may get a reply to questions, but the replies are irrelevant in the extreme. Irritability is often marked; logorrhea is continuous, the stimulus apparently is mostly internal, but at times, the trend of thought is obviously influenced by outside events.

The average course of an attack varies somewhat. As a general rule, after a few hours of mild excitement, there follows a period of from five to ten days' duration during which he will remain in bed, mute and resistive. Occasionally during this period a condition of mild excitement will return for transient intervals. During the first few days he is untidy in person.

The following note made during the first day of an "abnormal" phase may give some idea of the patient's condition at this stage. He was sitting alone talking rapidly and incoherently to himself, gesticulating, and at times, impressing one with the idea that he was arguing or demonstrating some point, when the following was taken:

"They are good leather with soft tops and have good soles (pointing to his shoes). They are fine, too, almost the size of tacks. These have no tacks at all; are sewed in the seams and then the tacks are put in the heels and the heels made satisfactory, and the cotton is sewed all around the sole. Some of these—that fellow, J——, he never, he gave them a sample. (Patient glances out of window and continues.) Who was that running a sleigh along out here the other day? (No snow at the time.) I don't see anything of it now. He ought to know these different foundations now. I don't know them. (Q. What are you talking about?) I am talking about when it starts—I cannot see. I know a good many different people like J—— C——, and I know the K——s; they look more like the L——s. Then they differ very little. Some of the A——s and P——s, people like that were there. I know a good many of the P——s, quite a number of them. These things (pointing to his ear to which a piece of gauze was clinging, blood examination having been made a few minutes before) have got clamps. They hold anything on while they stay, like a wet rag or a pocket-handkerchief. I know about such things. (Looking from the window again.) My! don't these windows look fine. These people can see them. (Q. Did you have any breakfast this morning?) I don't eat breakfast. I used to go to the buildings on Broad Street. People live along there that are white and other colors—Broad Street from the City Hall right straight out and along out there, R——s and J——s, people like that. Do you know any of them? (Q. Do you mean Philadelphia?) I was trying to find out Byron's name, his first name, the name that he had. I want to know his first name because I had an idea that he lived on Madison Avenue," etc.

This logorrhea, which is a fair specimen of the speech content, continued for a few hours after the patient was left, after which he went to

bed, when the following notes were made. As his room was entered there was no reaction, there being, for the first few minutes of the visit, an absence of both spontaneous and voluntary attention. Pupils react normally and with good excursion. The deep tendon reflexes are all exaggerated. Dermatographic reaction is prompt, intense, persistent and localised. There is a marked hyperidrosis. The face is much flushed and reddened. There is a hypertonic muscular resistence, which gives rise to a coarse clonic tremor when the attempt is made to move the extremities. There is no flexibilitas cerea. A fine flickering contraction of the individual muscle bundles of the calves of the legs and the dorsolateral regions of the feet is noted. He flinches before any sudden or quick motion, but objects gradually advanced may touch the cornea before the lids close. Later on during the visit, he would, to a certain extent, follow directions, obeying when asked to change his position, but exhibiting a marked parafunction and a tendency toward negativism. At this point he suddenly partially arose in bed, made a series of unintelligible motions, outlining circles with his index finger on his body and on the nearby wall. When asked to explain these, he shook his head in negation. Here, he objected to further examination and showed irritability when this was persisted in. The respiratory rate became somewhat increased and breathing was irregular and catchy. The tremor before noted, became more marked and the face redder. At this point he makes more signs, elevates his fingers, one, two or four, but will not speak. He makes it known that he understands and can speak, but will not, and more strenuously objects to the examination, turning his back on the visitors and resisting any change in his position.

Subsequent examinations have shown that the hypertonic trembling resistance can be made out only by sudden quick motions; a steady pull on the arm, for instance, will not elicit it. True flexibilitas cerea is probably never present, although he will leave his arms in any awkward position when they are so placed, but will immediately put them down when told that he may do so. Throughout all, the tendency to negation has been marked. He denies that he ever lived in Baltimore, knows nothing whatever about it, denies his own name and maintains that he knows no one of those present. During the "abnormal" phase, confusion of identities of both himself and others is quite frequent. He will, for instance, mistake the nurse for one of his old schoolmates. There is a tendency to reminiscence which is quite marked, most of the subject-matter of his logorrhea being composed of events which occurred years ago, before his illness began. The tendency to deny his own name is prominent. Repeatedly, when called by that name, he will insist that his name is Kelly. Sound association is also noted; for instance, the following: "My name is not C——. I never knew C——. I never heard of such a man; my name is Kelly and I spell it without any 'e,' as I have only a few e's, and cannot spare more. Some people say that C-o-e-l-e spells, but E-a-l spells eel. S-e-a-l spells seal. In German, E-i-l spells eel, but I don't

know anything about German; I have never crossed and never studied German. I don't know anything. I cannot hear and cannot see."

After varying durations of the mute and resistive phase, the first break in the attack is indicated when he begins to designate his wants by means of signs and gestures. The return to his "normal" condition occurs very gradually, mutism being generally the last symptom to disappear.

During his "abnormal" phases, his appetite is poor, and especially during the first three to five days, when he will take practically no food at all. There is consequently a fall in the weight curve, but this loss is rapidly regained, as during his "normal" phases his appetite is extremely ravenous.

When "well," he seems to have varying insight, but it is never more than partial. He realizes at times that he is ill and that it is necessary for him to remain in a hospital. At other times, however, he will deny absolutely his illness and explain his recurrent periods in bed by saying that he only goes there in order to break the monotony of his stay in the hospital. Apparently realizing his condition, he sometimes asks the nurse to take him to the disturbed ward, this being before his attack is outwardly evident. When "well," it is difficult to elicit anything from him concerning the events transpiring during the "abnormal" phases. He generally claims that he knows all that is going on, but at times will admit that there are periods when he does not know all and when he is occasionally confused.

Occasionally, he may be found in a rather happy, jovial mood. When spoken to, however, he is mute, but even in this state he is often noted to be smiling, laughing and nodding his head as if in response to some outside stimulus. It is difficult, however, to prove definitely, the existence of actual hallucinations or delusions. At other times, he will be found (though this is rare) with tears in his eyes, showing evidence of distress. There is, however, when "well," no affect depression to be ascertained, but rather is the lowering one of apathy and indifference. The reticence of the patient regarding himself, makes investigation difficult; co-operation with various tests is not well carried out. While "well," he has parole of the grounds and spends the greater part of his time out-of-doors, playing games and reading. He frequently makes excursions to town and enjoys going to the theatres. On these trips, he takes an almost childish delight in looking in the shop windows. While he is inquisitive, it is not to the degree of intrusiveness. He is generally quiet, polite and affable. He expresses some regard for his family when questioned, but spontaneously, he rarely speaks of them.

Looking over the whole course of the illness, the following points are to be noted:

(1) The attacks have become much shorter in duration and occur at more frequent intervals since the onset, although within the past few years there has been but little change in this respect.

(2) The change in the character of the individual attacks: in the early ones, excitement was quite a prominent feature, this gradually diminishing until, at the present time, only at the beginning is there a slight psychic ele-

vation lasting but a few hours. Occasionally, in the midst of an attack, mutism and reticence may be broken by a short period of laughing, singing, rhyming and logorrhea, but this is generally mild.

CASE 2.—No. 547, female, age 43.

Anamnesis.—There was one sister who died of tubercular meningitis; a paternal uncle was insane, and a maternal aunt has for a number of years been invalided with what is thought to be hysterical paralysis. There was no consanguinity, no history of alcoholic or drug addictions. History of the patient's early life is unimportant; there were no convulsions during childhood or later. She obtained a college education and was a good student. Since about sixteen years of age, at which time her mother died, she has been of a rather melancholic and depressed disposition, more reserved and quiet than formerly. Menstrual function was normal in all respects until 1890, at the age of twenty-five, when she received a severe fall from a horse; since then there has been considerable irregularity in time, associated with pains, headache, etc.

The first evidence of the present psychosis appeared in 1892, following the prolonged nursing of her sister. She became restless and irritable; at first would take no rest and then became insomnolent; was auto-accusatory (had neglected her sister) and attempted suicide. There were delusions of persecution, and both auditory and visual hallucinations. When she was admitted to this hospital in 1898 it was learned that since 1892 she had had repeated attacks at intervals of from two to three weeks and of from two to three weeks' duration. These have all been of a similar nature. More recently they have become more intense and violent, occurring at still more frequent intervals and lasting for shorter periods. Excitement is the most prominent feature during the attacks, when, at its height, she is violent and homicidal. A brief period of depression (apathy and inertia) may either precede or follow the excited phase; in the intervals she seems quite well.

1902.—Since her admission, the attacks have continued at frequent intervals. Her condition varies during the attack from day to day, and at times she will be huddled in one corner of the bed for hours, the picture of marked and deep confusion. During the excitement, her attention may be gained momentarily; there is little spontaneity. Her speech is irrelevant and she is to a degree, inaccessible, but to a certain extent, distractible. Negativism and stereotypy are sometimes present. Following her excited phases she is often confused. When "well," her memory of events during the excited period is but partial; attention is easily gained and fairly well maintained. Orientation in time, place and person is quite accurate. Her insight is fair and she realizes that she is ill, and, though she feels that she will not recover, says it causes her no depression or sadness. During the "well" periods, apathy and indifference are more marked than formerly, and now, she seldom leaves her bed. She says she can give no idea when an attack is approaching. Generally, there is insomnia and a feeling of "nervousness," and after that, a blank. During the first few days, espe-

cially, there are some cephalic cenesthesias—a sense of heat and discomfort—and there are auditory hallucinations; while toward the end of an attack there is a feeling of faintness and weakness. She thinks the voices may be imaginary, although they sound real to her. The many violent and impulsive acts which she commits cannot be resisted, and with their completion she experiences a sense of relief. In her excited phases she is resistive, aggressive, violent and threatening; she shouts, screams, grimaces and gesticulates; her language is profane and abusive; her speech is incoherent—there is no sequence in association or logic; irrelevance is marked and stereotyped expressions frequently interrupt; in attitude and manner she may be threatening, playful, erotic or dramatic.

1908.—During the past six years the attacks have occurred with about the same frequency. On comparing the present condition with that in 1902, it is found that the duration of the attacks remains practically unchanged: compared with the first year of the onset of the psychosis, it is found that they have become much more frequent and of decidedly shorter duration.

Present Condition.—There has been some change in the course of the attacks, as will be seen from a comparison of her condition in 1902 with that of 1908 (Charts 5 and 6).[1] Formerly, there was little evidence of the stupor which is now so marked. At the onset, which is sudden, abrupt and unheralded, occurring in the early morning usually, there is wild psychomotor excitement; this after a few days, gives way to a mixed state of alternating excitement and stupor, which is, in turn, replaced by a condition of stupor of varying intensity, from which she emerges to her "normal" state.

The section of Chart 5 best showing a characteristic cycle, is that beginning March 6, for ten days, uniform excitement, then a similar duration of the mixed phase, this being succeeded by a period in which stupor of varying depth was present, and followed by "normal."

Chart 6 shows a condition of almost uninterrupted excitement throughout the entire "abnormal" phase. The excitement is of a high degree—laughing, singing, shouting, screaming, swearing, grimacing and gesticulating. Her speech is incoherent, often but a jargon of unintelligible

[1] Charts 5 and 6 were necessarily made by different nurses, but each chart was made by the same individual throughout. In gathering data for Chart 5, the stimulus was, so far as possible, on all occasions the same. The nurse entered the patient's room and silently observed her for five minutes, then approached the bed and raised the patient's arm. At each observation, points common to this patient were noted, viz., whether she was laughing, shouting, screaming, singing or whistling, or whether she was mute, aggressive, passive or resistive, and from these collectively, the degree of elevation above, or of depression below, the "normal line" was judged. The circles indicate that she was sleeping and are placed on the same lines, it being considered that she was in the same condition as when last awake.

sounds, and often showing a marked tendency to stereotyped repetition. The attitude is one of aggressiveness and violence. She may be obscene, abusive, vulgar and threatening; often becoming even within the next moment, playful, erotic and affective. During this phase, her attention may be gained momentarily and she will often interpolate into her jargon, words spoken in her presence and occasionally will make pertinent comments on remarks which she hears. For the most part, however, she is inaccessible and is quite irrelevant, though at times she may be directed or distracted.

While blood examination was being made, during one of the excited days, the following, representing 8 minutes spontaneous production, was taken: "Sign yourself, sign yourself (laughs), nothing, nothing, nothing. Yes, you do it yourself, do it yourself. How many more? How many more of them? How many more are there? I am tired of these things (blood smears were being made)—my father took it out—eight o'clock—no, nothing. What's that in your mouth? (blood pipette). Transactions—put that in your mouth. Can you see? Who is this? I don't know. How many more is there? How much of that trash have you got there? How many more of them? I will get up on the stage. How many more of them are there? How many more? How is your stomach (laughs)? Blue flag (looking at physician's blue necktie—laughs) yes, yes, yes (laughs), good-bye (this to the nurse who leaves the room). (Q. Are you happy now?) Perfectly."

During the excited stage she sleeps but little; is entirely negligent of care of self. During the first few days, she takes but very little nourishment, frequently refusing everything. For a number of days, only fluids are taken, and lastly, meats and other solid foods. During this period she loses in weight, but gains during her "normal" phases. During the past year there has been a total gain of twenty pounds, her weight now being 123. Although no physical examination during her excited periods is possible, it may be noted that her pupils are dilated and there is a marked erythema of the nose which progressively increases during the first several days.

The second element, stupor, varies in depth. In the most intense grade, she is absolutely passive, inert and irresponsive to all stimuli. When, however, the stimulus proves sufficient, she will pass almost instantaneouly into a state of violent excitement and rage. At times, merely entering her room will cause a transition of this nature; whereas, again, it may be impossible to rouse her. The stimulus necessary is less in the middle than toward the end of the "abnormal" phase. During the stuporous phase, she sleeps the greater part of the time. Within the last two years it has been noted that often toward the end of her "abnormal" phases, there have occurred periods varying from one-half to twenty-four hours, during which she seems in her "normal" state. Following such periods, she may become excited, or relapse into the stuporous condition.

An examination while "well," reveals that she is in remarkably good

physical condition considering her mode of life. Pupils are oval, and eccentrically placed; they react normally. Dermatographic reaction is below the normal. The deep reflexes are exaggerated; cutaneous sensation is acute and normal. Even during this examination, although she is considered "well," she seems to be quite irritable and unstable, loath to be disturbed; her expression is somewhat sullen, and again, indifferent.

In her "normal" condition, she is generally accessible, affable and pleasant; attention is easy to gain and hold during ordinary conversation. There is, however, little spontaneous production and she limits herself to brief replies. She is oriented as to person and place, and quite accurately as to time. She reads the newspapers and when asked, comments with understanding, on their contents. Memory for remote events is fairly good; she knows but little of happenings during her "abnormal" phases, although she can tell, when she was last "well." Calculation is fairly accurate and quite rapidly performed. She does not say much about her illness; cannot tell when the attack is coming on. Although she says she would rather be well than as she is, her present condition leaves not the slightest trace of depression or sadness. Only when questioned, does she speak of her relatives, although quite recently she voluntarily wrote a note to one of them, requesting a visit. (It is interesting to note that the wording of this letter is almost identical with several that have been written during the past few years.) Occasionally during her "well" periods, she is distinctly below par, but not stuporous. During such times, she will answer questions but not so quickly, fully, or briskly as usual. (Such a condition is shown in Chart 5, from March 1 to 6. Also, a short period of well-marked lowering is shown in the same chart—February 8.) Both of these conditions when present, generally precede the onset of the excited phase.

As in some cases, exacerbation of the mental symptoms seems to occur with some relation to the menstrual function, this point has been carefully observed for several years past. Apparently, there is no regular association between the two, as may be seen in Chart 4.

We have here, two individuals in whom a psychosis developed during early life. Since the onset, both have been subject to recurring attacks at gradually decreasing intervals, which present many points in common. Early in the course, there were in both, periods of marked psychomotor excitement which at times were replaced by a depressed and confused condition. Hallucinations and delusions were present, disorientation was not in evidence; tendencies toward stereotypy in speech and action, neologisms, irrelevance, incongruity in affective states, with emotional dulling, purposeless resistence with a retardation amounting to stupor, during which mutism, refusal of nourishment and attention were

present, have all been prominent. As the disease progressed, the excited phases have gradually lessened in degree, at the same time, there being an increase in the duration and depth of the stupor.

During the intervals, which are here spoken of as "normal" or "well" periods, in contradistinction to the "abnormal," both patients were capable of a varying amount of mental activity; yet there is no doubt but that deterioration of an easily discernible grade obtains. With the woman, the process has been evidently of greater severity. During her "normal" periods, there is exhibited a marked degree of affect lowering—little spontaneity in thought or action is ascertainable, interest in pleasures or diversions has reached a low ebb, and contentedly remaining in bed from day to day, she declares in a lackadaisical manner that she is "perfectly happy."

With the other, the condition is somewhat different. When "well," his interest in pleasure-seeking and amusement is patent, up early in the morning and out of doors, daily perusing the newspapers or current fiction, taking part in the games with other patients, or planning with youthful delight, the details of some excursion for the morrow—all this contributing to disguise and conceal the actual mental impairment which is to be made out on closer acquaintance. Here, is seen the effect of association with the outside world—activity is continued, interest kept up and desire stimulated.

Although the initial severity of the disease process, and although the sexual element, the more generally inherent passivity and submission of the female organism, may explain partially the difference in this particular aspect of the present condition of these two patients, the question arises: Would not this man, after an existence of a number of years in a similar unstimulating environment, have exhibited as marked an affective decolorization as the woman? Are we not too prone at times to overlook the result of such an isolation in a mentally normal person? With the knowledge of the loss of this possibility of attainment, would there not be associated naturally a weakening of the desire and interest—a state of more or less intense apathetic indifference and inertia?

When we come to the question of diagnosis, in which nosologic category may these two cases be placed? There are present many

of the symptoms commonly described as part and parcel of that condition summarized by the now already overtaxed diagnosis—dementia precox. There were the early onset, with hallucinations and delusions, verbigerations, stereotypy, negativism, echolalia, neologisms, muticismus, impulsive actions, etc. Again, were noted the marked motor activity and psychic elevation, rhyming, paralogia, inaccessibility, distractibility, and sound associations. At other times, confusion and definite clouding of consciousness exists. Throughout all, memory of past events is fairly well preserved, orientation is quite accurate, with, however, a deficit in insight and judgment. At the present, one cannot miss the evident mental depreciation—want in spontaneity, defective emotional tone and more or less dissociated affective reaction.

It does not seem that any one disease entity suffices to sum up fully and accurately the status of these two patients. Therefore, they are presented as atypical psychoses, related to the dementia precox group and particularly to the catatonic variety, in which recurrent attacks, consisting of alternations between phases of varying length of excitement of a maniacal-depressive character, and stupor, persisting throughout a number of years have left the present condition of moderate deterioration noticeable principally in the affective sphere.

Explanation of Charts.

To show more in detail the relation of the temperature, blood pressure, pulse and respiration during a typical cycle, charts have been made. In Chart 1 (Case 1) the curve of blood pressure is not shown in its usual variation. Very frequently during the "abnormal" phase, it will reach 200, or higher. The respiration shows an increase in rate, although this too, like the blood pressure, is not easily demonstrable in such a chart. The temperature and pulse curves on this chart show well, the usual fluctuation seen in this patient. From November 27 to December 6, he was up and dressed and about, being considered in his "normal" state. During this time, as will be seen, his temperature was subnormal. The pulse kept within normal limits. Although the temperature curve gradually reached its highest point on December 1 and 2, from there on, again, it rose each day until, on December 7, it

passed above the normal line, and on this day he entered upon one of his " abnormal " phases. Remaining well above the normal until December 17, it gradually fell, going below normal on the 21st, the patient getting up and dressing on the 25th.

As may be seen from this small section, which is quite typical, the curves on the clinical chart show almost unbroken, wavelike changes corresponding with the mental condition. Variations are, however, noticed, which will be pointed out presently.

In Chart 2 (Case 1) an attempt has been made to show the relation existing between the changes in the blood pressure, pulse, temperature and respiration, and the blood—especially the number of leucocytes during the different phases of the cycle. This represents a daily chart; the clinical observations are those taken at 7 p. m. The heavy block lines above represent days when he was passing through an attack—" abnormal " days. No attempt to divide this into periods of exaltation or depression has been made, as his condition during the past year during his " abnormal " phases has been almost uniformly one of depression or stupor. The last two blocks connected by the two lines, differ from the usual. It was about at that time that it was decided to make daily observations of the blood condition during a complete cycle. Thinking that the " abnormal " phase was about to end, a start was made February 21. From February 25 to March 5, he was up and about and generally considered to be in his " normal " condition, although he was somewhat dull and stupid and wanting in his usual interests and energy.[2] It was noted during this period that his leucocyte count remained higher than usual during his " well " stages. The peculiar behavior of the temperature curve during this period is to be noted in comparison with all others. At this point it resembles more closely the curve shown in Chart 4 (Case 2).[3]

In Chart 2, the striking correspondence in the variation of the temperature curve and that representing the number of leucocytes

[2] The observations here recorded were made almost exclusively by the same nurse; this is true of all other charts.

[3] The enormous temperature variations of Charts 2 and 4 are only apparent, and due to the fact that between each two horizontal lines, there is represented only 2/10 of a degree Fahr.; whereas, with the blood pressure, pulse and respiration, the same space is worth several points.

needs not to be pointed out. It is to be noted that both curves decrease and increase somewhat before the beginning and ending of an "abnormal" phase, although variations from this rule occur, as seen in the attack beginning March 11. It may be seen from Charts 1 and 2, that some idea of the advent of an attack and also of its ending, can be formed by following the clinical charts; whereas, in Charts 3 and 4 (Case 2) no idea is given of the approaching onset, though one may expect the ending. In neither case, however, are these indications always to be relied upon.

Charts 3 and 4 (Case 2) are to be compared with similar ones in Case 1. They were made in a similar manner, with the exception that on Chart 4 the "abnormal" periods are indicated by the heavy block lines below, while the similar lines above indicate the menstrual epochs.[1] In Chart 3, it is seen that an enormous sudden and abrupt rise in all four curves takes place with the onset of the excitement. This rise is well maintained for a number of days and only gradually falls to "normal." In Chart 4, this is also shown in relation to the variation in the number of leucocytes.

On comparing similar charts in these two cases, it will be seen that there is a striking resemblance. In both, there is a rise in all of the curves at the onset of, and during the "abnormal" phase. In Case 1, the rise is more commonly a gradual one, with the exception, as had been mentioned, occurring in the period beginning February 11 (Chart 2); whereas in Case 2, the rise is as sudden as it is decided. In Case 1, these various curves barely reach normal, when they again begin to show a gradual rise, thus producing the wavelike fluctuations previously noted. In Case 2, however, during the "well" periods, the curves all remain quite uniformly normal, or slightly below; the variations in this case being more closely confined to the days while the patient is "abnormal."

Technique of Blood Examinations.—An attempt has been made to observe all of the usual precautions advised to prevent errors in blood work.

[1] As there was a marked degree of excitement in Case 2, especially at the onset, and as this might affect the various observations made, particularly the respiration and blood pressure, care was taken in each instance that after adjusting the cuff over the brachial artery, several minutes were allowed to pass before the pressure was taken. As a general rule, within this length of time she would cease struggling entirely. A Riva Rocci instrument, with a broad cuff, was used in determining all blood pressures.

a sharp and energetic reaction. It is evident that if the overproduction is great and is accompanied by a renal obstacle, the accumulation of toxins may quickly reach its maximum point while the urine at the same time may be hypo- or hypertoxic and the crises frequent. If the overproduction of toxins is slight the same renal obstacle will stop almost all the poisons filtered from the blood into the urine. One then has a condition of urinary hypotoxicity accompanied by rare epileptic crises because a much longer time is necessary for the poisons to accumulate to the degree necessary to produce the same reaction.

If only the retention of toxins existed, how could one explain the hypertoxicity before the crises or very frequent crises accompanied by a marked hypertoxicity. RICKSHER.

Sur les accessoires de l'habillement dans la démence précoce et dans la psychose maniaque-dépressive. Note semiologique par GAETANO BOSCHI. Nouvelle Iconographie de la Salpêtriere, 21st Annee, p. 75, Janvier-Février, 1908.

This paper is unusually well illustrated by photogravures and is a pleasant excursion into one of the by-paths of psychiatry, rather than of especial clinical value. The author's conclusions are too long to reproduce here, but the most important are that in the insane, ornamentation of clothing is a symptom of valuable diagnostic value when taken with others, as alone it has little value. In dementia præcox there may be a characteristic stereotypy shown in the ornamentation, while in the excitement of maniacal-depressive insanity there may be many changes. Those depressed and those excited but not happy do not ornament their clothing. A change of sex in ornamentation is more frequent in women than in men and in the maniacal than in the demented. W. R. D.

La glande thyroide chez les alienes. Par J. RAMADIER ET L. MARCHAND. L'Encephale, An. 3, p. 121, aout, 1908.

The conclusions to this paper are:

The weight of the thyroid gland varies according to locality. In the asylùm at Rodez 72.6 per cent of the glands weighed over 30 gm.; at Blois 31.2 per cent; at Rennes 6.6 per cent; at Villejuif 18.1 per cent.

The macroscopic lesions of the gland are especially frequent in the insane living in goitrous localities.

Microscopic lesions of the thyroid gland are very common, as much in those who have never had mental trouble as in the insane.

Of 48 glands from the insane at Loir-et-Cher, 8 were absolutely normal; 16 showed only a slight sclerosis; 5 showed sclerosed portions beside healthy areas; 14 showed a diffuse sclerosis with atrophy of the vesicles; 2 showed parenchymatous inflammation; and 1 an interstitial inflammation. W. R. D.

Apraxie et démence précoce. Par G. DROMARD. L'Encephale, An. 3, p. 162, aout, 1908.

The author has carefully examined two cases of dementia præcox relative to their ability to perform varied movements, and comes to the following conclusions:

(1) There is an intellectual apraxia as well as a motor apraxia and a sensory apraxia.

(2) Psychologically, intellectual apraxia corresponds to a disorder in voluntary activity produced in the phase that is immediately consecutive to the representation of the act and in the course of which is effected the ideational preparation of the detailed plan of this act.

(3) Clinically, intellectual apraxia places us in the presence of a confused mass of reactions which are extremely varied and which are not always easy to unravel. These reactions are shown by omissions, misplacements, substitutions and suspensions in the course of the partial acts which by their union form a complete act. They are always associated with a greater or less disorder of the attention.

(4) The analysis of such phenomena seems to us to clear up the disorders of motility shown by precocious dements in uniting the whole in one theory and in a single word the phenomena which have been interpreted in a thousand ways and described under most varied and inexact terms by others.

Cases of this kind studied patiently and with minute detail permit a further study of certain conditions to which have been applied the very vague term of "obnubilation"; they may also bring about suggestive contributions in the differentiation of pseudo-dementias. W. R. D.

Ricerche sul potere riducente delle urine nella frenosi maniaco-depressiva. Del O. PINI. Manicesmio, An. XXIV, p. 155, 1908.

This research has been made in a way similar to those of Alberti, Pighini, etc. In this study ten normal individuals were studied to establish a standard, after which six cases were studied in periods of excitement and periods of depression. Observations were made for six days in each instance. As a result it was found that there is an increase of the reducing power of the urine during the period of excitement; an increase of the same, although in less degree, during the stage of depression; a diminution of it after a state of prolonged excitement and a slowing of organic oxidation especially marked in the depressive period.

W. R. D.

Der Kopfschmerz bei der Dementia præcox. Von DR. TOMASCHNY. Allgemeine Zeitschrift für Psychiatrie, Bd. 65, p. 778, 1908.

The conclusions to this study are as follows:

(1) Headache is a very frequent symptom in the course of dementia præcox as well as in the early stage.

(2) Headache in dementia præcox frequently shows a remitting and exascerbating course. It comes and goes frequently in catatonic excitement.

(3) The occurrence of headaches is a support for the theory that dementia præcox is an autointoxication disease process.

W. R. D.

Troubles psychiques par perturbations des glandes à sécrétion interne. Par M. LAIGNEL-LAVASTINE. Journal de Neurologie, 13 Annee, p. 316, 336, 355 and 373.

This is the address in psychiatry made at the recent congress held at Dijon, August, 1909. As a summary, or epitome, of our knowledge of the mental disturbances commonly associated with change in function of the internal glands is a valuable communication. Naturally, such a paper does not allow a good abstract, as it is of itself so much condensed, but the author's conclusions, which were submitted to the congress for discussion, are of interest and are here given:

(1) There is a causal relationship between disturbances of the internal secretory glands—thyroid, parathyroid, suprarenal, ovary, testicle—and their corresponding syndromes: myxœdema, exophthalmic goitre, tetanus, eclampsia, gigantism, acromegaly and Addison's disease and ovarian insufficiency and deviation.

(2) Is there a causal relationship between these same disturbances and certain psychic disorders, accompanied by their respective syndromes?

(3) If so, which psychic disorders, and by what criteria may we recognise as of glandular origin? May we admit a glandular origin for the psychic disorders such as are found in the majority of the insane where the respective glandular syndromes are not easily appreciable?

(4) Taking into consideration cerebral predisposition, may we admit the possibility of a glandular origin of certain cases of cerebral weakness, dementia præcox, partial delirium, functional nervous disorders, hysteria, neurasthenia, psychasthenia?

The consensus of opinion was that the first of the above was quite true, the second probable and the third and fourth possible.

W. R. D.

VOLUME LXV APRIL, 1909 No. 4

AMERICAN JOURNAL OF INSANITY

A CLINICAL STUDY WITH BLOOD EXAMINATIONS OF TWO ATYPICAL CASES RELATED TO THE DEMENTIA PRECOX GROUP.

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That the study of the blood of the insane has provided an attractive field for research during the past half century or more, may easily be determined by a casual glance over the literature accumulated during that time. Because of the inaccuracy of the methods known to the older workers, not much value can be placed on the results which they obtained. With the advances made in the clinical methods for examining the blood, there has been a coincident gain in a more accurate knowledge of the hematologic changes which occur, both in healthy and diseased states, so much so that a blood examination in certain maladies is essential to verify the diagnosis. Could it not reasonably be expected that in psychiatric medicine there might be some characteristic divergences from the normal in the blood picture? The older, and also some of the recent investigators in this field, concur in the opinion that there is in general, some deterioration, a mild secondary anemia, present in most cases. This, however, cannot be said to be characteristic of any one psychosis or of the psychoses as a whole, but is more probably the direct result of the mode of life among the insane, as was pointed out by Lindsay more than fifty years ago. More recent studies have apparently shown that undoubted changes occur in the number of leucocytes, and some observers, of which class Bruce is perhaps the foremost exponent, believe that factors of diagnostic importance can be ascertained from an estimation of the number of white blood cells.

Further work is needed to fully substantiate these views. At the present time, it seems that such conclusions push the pendulum to its widest excursion and at a rate which, later on, it may be found necessary to retard.

Not only has the morphology of the blood been investigated, but considerable time and energy have been expended in studying other points—the specific gravity, tonicity, reaction, viscosity, and the detection of the presence or absence of abnormal constituents, particularly the existence of toxins or other deleterious substances of a similar nature. Factors known to affect the condition of the blood, such as muscular exercise, nourishment, temperature and blood pressure variations, have all received more or less careful attention, and have resulted in findings which are fairly uniform.

It is only within comparatively recent years that sufficiently carefully-controlled observations extending over a considerable period of time have been carried out. A vast majority of the papers relating to the condition of the blood in the various psychoses, report the results of examinations in a great many cases which were not, however, studied for any length of time; indeed, in many cases, not more than one or two examinations in all were made. And again, many writers have attempted to bring the results of their blood examinations into accord with the various clinical types of mental disease, without particular regard to the exact condition of the patient at the time of the examination.

Thinking that frequently repeated examinations of the blood in a few selected cases, continued over a long period of time, might be of some value, this work was undertaken in the fall of 1907. It was decided to study, at first, only such cases in which the symptom of stupor supervened, disregarding, for the time being, the character of the underlying psychosis.

Almost at the beginning of this work, the two cases here presented, were found to possess such similarities, and on the other hand, to differ so widely from the ordinary type, that they have been reported together.

As within a period of ten years or more, a vast amount of data concerning these patients has been accumulated, the histories will first be given, and then the consideration of the results of the blood examination, in connection with the clinical conditions existing, will be taken up.

CASE 1.—No. 541, male, age 46.

Anamnesis.—A maternal great-aunt suffered with some mental trouble, the nature of which is unascertainable. There was a distant blood relationship between the father and mother. One brother and one sister are characterized as "neurotic," and one sister developed a psychosis from which she did not recover; otherwise, the history is unimportant. No alcoholic or drug addictions. The mother was 27 years old when he was born, the fifth of ten children. As a child he had some mild convulsive attacks, and in boyhood, there was a trifling head trauma. Puberal epoch was uneventful. He attended school until fifteen and is said to have done average work, but to have been more inclined toward games and amusements than toward study. After leaving school, and until the onset of present illness, he was employed in various clerical positions, always rendering efficient and satisfactory services and exhibiting ambition and diligence. There is no luetic history.

The first mental attack occurred about 1890, when he was twenty-eight or nine years old. The first symptoms appeared abruptly; some suspiciousness and ideas of reference of a mild persecutory nature, coincident with motor-restlessness; and later, seclusiveness and reticence. Psychomotor activity gradually increased, developing into a condition of turbulent excitement, throughout which was noted a tendency towards posing and attitudinizing. No suicidal or homicidal tendencies were exhibited. After about a month, he was considered "almost well."

The next attack, which was similar to the first, occurred at the time of his mother's death some six or eight months later. There were no further attacks until 1894, when he was first admitted to this hospital, then in the midst of an excited attack which had begun three weeks previous. For another month, excitement continued. There were marked psychomotor activity, incoherent and disconnected rambling logorrhea, inaccessibility and irrelevancy; also suspiciousness and mild delusions of a persecutory nature. These symptoms gradually disappeared, and he was discharged improved. From this time until 1897, when re-admitted, he passed through two or three similar attacks. During this time his disposition underwent a marked change and he became irritable, complaining and domineering. This attack lasted several months, when he was again taken home where he remained idle, inactive and indifferent; when, becoming excited, he was re-admitted to the hospital in 1898, where he has since remained.

1900.—Since his last admission, the attacks have become more frequent and of shorter duration. At the onset, there is noted motor-restlessness, insomnia, irritability, inaccessibility and irrelevance. The excitement rapidly reaches its height, and auditory and visual hallucinations are present. During this time he is careless in person and habits. The attacks average now, from five to six weeks in duration. The only change is the appearance recently, of short periods of mutism, posing, etc., in an otherwise excited day.

1902.—During the past two years, the attacks have become even more frequent and of still shorter duration. Excitement begins the attacks as formerly, but lasts now only from one to three weeks, when it is replaced by a short, stuporous period from which he emerges into his "normal" condition. Excitement is the most prominent feature of the attacks, although stupor is becoming more pronounced both in intensity and duration.

1904.—At the onset of his attacks, there is a marked tendency toward talkativeness, with some distractibility and complete irrelevancy in answers, frequently singing or chanting his replies, and often rhyming. Distractibility and accessibility become less noticeable, even to a self-centered inaccessibility. Words heard are interpolated into his continuous logorrhea. There is some resistance to passive motion; a coarse volitional tremor, and at times, negativism, are present. When "well," he denies his illness, but admits that he used to have attacks of "nervousness." His insight is partial, judgment poor; mental deterioration is not marked. Physically, he continues in excellent health.

1906.—Within the past two years, the attacks have begun with less noise and turbulence. The initial logorrhea is still present but is much milder. Soon, the former excitement appears and after several days, gradually subsides into a depression of a few days' duration, from which he passes into his "normal" condition. During the past summer while "well," he has been unusually drowsy and disinterested in his usual pursuits. Since September, his attacks frequently begin with a mute, stuporous period which lasts but a short time, and this is replaced by a period of excitement from which, however, the motor element has almost completely disappeared. During this excitement he is, to a degree, inaccessible, distractible, and irrelevant. His continuous logorrhea is without order or sequence in association or reasoning. With the abatement of the excitement, stupor, together with mutism and resistiveness appear, and in turn, these symptoms gradually vanish as the patient approaches "normal." This stuporous phase is now fully as prominent as the excitement, both in its depth and duration.

1908.—The most noticeable change is the increasing prominence of the stuporous element, this now constituting almost the entire abnormal phase.

Present Condition.—On reviewing the condition for the past year, one finds that the changes which have taken place have been those of detail only. As a general rule, the patient exhibits no prodromal signs by which the beginning of an "abnormal" period can be detected. Occasionally for a period of from 24 to 48 hours, he may appear drowsy and disinterested in his usual pastimes. The onset may occur in either one of two ways: after a night's undisturbed sleep, he may awake mute and resistive; later in the day this mutism may be interrupted by a psychic elevation with marked logorrhea, irrelevancy in answers and inaccessibility, with slight distractibility, which condition, however, is soon replaced by the former one of mutism and resistiveness. The most common onset is that with mild excitement which persists for several hours and is replaced by a mute, re-

sistive phase. During the excited phase he is quite inaccessible; attention is poor or wanting and there is but little distractibility or divertibility; association is rapid but imperfect. Occasionally one may get a reply to questions, but the replies are irrelevant in the extreme. Irritability is often marked; logorrhea is continuous, the stimulus apparently is mostly internal, but at times, the trend of thought is obviously influenced by outside events.

The average course of an attack varies somewhat. As a general rule, after a few hours of mild excitement, there follows a period of from five to ten days' duration during which he will remain in bed, mute and resistive. Occasionally during this period a condition of mild excitement will return for transient intervals. During the first few days he is untidy in person.

The following note made during the first day of an "abnormal" phase may give some idea of the patient's condition at this stage. He was sitting alone talking rapidly and incoherently to himself, gesticulating, and at times, impressing one with the idea that he was arguing or demonstrating some point, when the following was taken:

"They are good leather with soft tops and have good soles (pointing to his shoes). They are fine, too, almost the size of tacks. These have no tacks at all; are sewed in the seams and then the tacks are put in the heels and the heels made satisfactory, and the cotton is sewed all around the sole. Some of these—that fellow, J——, he never, he gave them a sample. (Patient glances out of window and continues.) Who was that running a sleigh along out here the other day? (No snow at the time.) I don't see anything of it now. He ought to know these different foundations now. I don't know them. (Q. What are you talking about?) I am talking about when it starts—I cannot see. I know a good many different people like J—— C——, and I know the K——s; they look more like the L——s. Then they differ very little. Some of the A——s and P——s, people like that were there. I know a good many of the P——s, quite a number of them. These things (pointing to his ear to which a piece of gauze was clinging, blood examination having been made a few minutes before) have got clamps. They hold anything on while they stay, like a wet rag or a pocket-handkerchief. I know about such things. (Looking from the window again.) My! don't these windows look fine. These people can see them. (Q. Did you have any breakfast this morning?) I don't eat breakfast. I used to go to the buildings on Broad Street. People live along there that are white and other colors—Broad Street from the City Hall right straight out and along out there, R——s and J——s, people like that. Do you know any of them? (Q. Do you mean Philadelphia?) I was trying to find out Byron's name, his first name, the name that he had. I want to know his first name because I had an idea that he lived on Madison Avenue," etc.

This logorrhea, which is a fair specimen of the speech content, continued for a few hours after the patient was left, after which he went to

bed, when the following notes were made. As his room was entered there was no reaction, there being, for the first few minutes of the visit, an absence of both spontaneous and voluntary attention. Pupils react normally and with good excursion. The deep tendon reflexes are all exaggerated. Dermatographic reaction is prompt, intense, persistent and localised. There is a marked hyperidrosis. The face is much flushed and reddened. There is a hypertonic muscular resistence, which gives rise to a coarse clonic tremor when the attempt is made to move the extremities. There is no flexibilitas cerea. A fine flickering contraction of the individual muscle bundles of the calves of the legs and the dorsolateral regions of the feet is noted. He flinches before any sudden or quick motion, but objects gradually advanced may touch the cornea before the lids close. Later on during the visit, he would, to a certain extent, follow directions, obeying when asked to change his position, but exhibiting a marked parafunction and a tendency toward negativism. At this point he suddenly partially arose in bed, made a series of unintelligible motions, outlining circles with his index finger on his body and on the nearby wall. When asked to explain these, he shook his head in negation. Here, he objected to further examination and showed irritability when this was persisted in. The respiratory rate became somewhat increased and breathing was irregular and catchy. The tremor before noted, became more marked and the face redder. At this point he makes more signs, elevates his fingers, one, two or four, but will not speak. He makes it known that he understands and can speak, but will not, and more strenuously objects to the examination, turning his back on the visitors and resisting any change in his position.

Subsequent examinations have shown that the hypertonic trembling resistance can be made out only by sudden quick motions; a steady pull on the arm, for instance, will not elicit it. True flexibilitas cerea is probably never present, although he will leave his arms in any awkward position when they are so placed, but will immediately put them down when told that he may do so. Throughout all, the tendency to negation has been marked. He denies that he ever lived in Baltimore, knows nothing whatever about it, denies his own name and maintains that he knows no one of those present. During the "abnormal" phase, confusion of identities of both himself and others is quite frequent. He will, for instance, mistake the nurse for one of his old schoolmates. There is a tendency to reminiscence which is quite marked, most of the subject-matter of his logorrhea being composed of events which occurred years ago, before his illness began. The tendency to deny his own name is prominent. Repeatedly, when called by that name, he will insist that his name is Kelly. Sound association is also noted; for instance, the following: "My name is not C——. I never knew C——. I never heard of such a man; my name is Kelly and I spell it without any 'e,' as I have only a few e's, and cannot spare more. Some people say that C-o-e-l-e spells, but E-a-l spells eel. S-e-a-l spells seal. In German, E-i-l spells eel, but I don't

know anything about German; I have never crossed and never studied German. I don't know anything. I cannot hear and cannot see."

After varying durations of the mute and resistive phase, the first break in the attack is indicated when he begins to designate his wants by means of signs and gestures. The return to his "normal" condition occurs very gradually, mutism being generally the last symptom to disappear.

During his "abnormal" phases, his appetite is poor, and especially during the first three to five days, when he will take practically no food at all. There is consequently a fall in the weight curve, but this loss is rapidly regained, as during his "normal" phases his appetite is extremely ravenous.

When "well," he seems to have varying insight, but it is never more than partial. He realizes at times that he is ill and that it is necessary for him to remain in a hospital. At other times, however, he will deny absolutely his illness and explain his recurrent periods in bed by saying that he only goes there in order to break the monotony of his stay in the hospital. Apparently realizing his condition, he sometimes asks the nurse to take him to the disturbed ward, this being before his attack is outwardly evident. When "well," it is difficult to elicit anything from him concerning the events transpiring during the "abnormal" phases. He generally claims that he knows all that is going on, but at times will admit that there are periods when he does not know all and when he is occasionally confused.

Occasionally, he may be found in a rather happy, jovial mood. When spoken to, however, he is mute, but even in this state he is often noted to be smiling, laughing and nodding his head as if in response to some outside stimulus. It is difficult, however, to prove definitely, the existence of actual hallucinations or delusions. At other times, he will be found (though this is rare) with tears in his eyes, showing evidence of distress. There is, however, when "well," no affect depression to be ascertained, but rather is the lowering one of apathy and indifference. The reticence of the patient regarding himself, makes investigation difficult; co-operation with various tests is not well carried out. While "well," he has parole of the grounds and spends the greater part of his time out-of-doors, playing games and reading. He frequently makes excursions to town and enjoys going to the theatres. On these trips, he takes an almost childish delight in looking in the shop windows. While he is inquisitive, it is not to the degree of intrusiveness. He is generally quiet, polite and affable. He expresses some regard for his family when questioned, but spontaneously, he rarely speaks of them.

Looking over the whole course of the illness, the following points are to be noted:

(1) The attacks have become much shorter in duration and occur at more frequent intervals since the onset, although within the past few years there has been but little change in this respect.

(2) The change in the character of the individual attacks: in the early ones, excitement was quite a prominent feature, this gradually diminishing until, at the present time, only at the beginning is there a slight psychic ele-

vation lasting but a few hours. Occasionally, in the midst of an attack, mutism and reticence may be broken by a short period of laughing, singing, rhyming and logorrhea, but this is generally mild.

CASE 2.—No. 547, female, age 43.

Anamnesis.—There was one sister who died of tubercular meningitis; a paternal uncle was insane, and a maternal aunt has for a number of years been invalided with what is thought to be hysterical paralysis. There was no consanguinity, no history of alcoholic or drug addictions. History of the patient's early life is unimportant; there were no convulsions during childhood or later. She obtained a college education and was a good student. Since about sixteen years of age, at which time her mother died, she has been of a rather melancholic and depressed disposition, more reserved and quiet than formerly. Menstrual function was normal in all respects until 1890, at the age of twenty-five, when she received a severe fall from a horse; since then there has been considerable irregularity in time, associated with pains, headache, etc.

The first evidence of the present psychosis appeared in 1892, following the prolonged nursing of her sister. She became restless and irritable; at first would take no rest and then became insomnolent; was auto-accusatory (had neglected her sister) and attempted suicide. There were delusions of persecution, and both auditory and visual hallucinations. When she was admitted to this hospital in 1898 it was learned that since 1892 she had had repeated attacks at intervals of from two to three weeks and of from two to three weeks' duration. These have all been of a similar nature. More recently they have become more intense and violent, occurring at still more frequent intervals and lasting for shorter periods. Excitement is the most prominent feature during the attacks, when, at its height, she is violent and homicidal. A brief period of depression (apathy and inertia) may either precede or follow the excited phase; in the intervals she seems quite well.

1902.—Since her admission, the attacks have continued at frequent intervals. Her condition varies during the attack from day to day, and at times she will be huddled in one corner of the bed for hours, the picture of marked and deep confusion. During the excitement, her attention may be gained momentarily; there is little spontaneity. Her speech is irrelevant and she is to a degree, inaccessible, but to a certain extent, distractible. Negativism and stereotypy are sometimes present. Following her excited phases she is often confused. When "well," her memory of events during the excited period is but partial; attention is easily gained and fairly well maintained. Orientation in time, place and person is quite accurate. Her insight is fair and she realizes that she is ill, and, though she feels that she will not recover, says it causes her no depression or sadness. During the "well" periods, apathy and indifference are more marked than formerly, and now, she seldom leaves her bed. She says she can give no idea when an attack is approaching. Generally, there is insomnia and a feeling of "nervousness," and after that, a blank. During the first few days, espe-

cially, there are some cephalic cenesthesias—a sense of heat and discomfort—and there are auditory hallucinations; while toward the end of an attack there is a feeling of faintness and weakness. She thinks the voices may be imaginary, although they sound real to her. The many violent and impulsive acts which she commits cannot be resisted, and with their completion she experiences a sense of relief. In her excited phases she is resistive, aggressive, violent and threatening; she shouts, screams, grimaces and gesticulates; her language is profane and abusive; her speech is incoherent—there is no sequence in association or logic; irrelevance is marked and stereotyped expressions frequently interrupt; in attitude and manner she may be threatening, playful, erotic or dramatic.

1908.—During the past six years the attacks have occurred with about the same frequency. On comparing the present condition with that in 1902, it is found that the duration of the attacks remains practically unchanged: compared with the first year of the onset of the psychosis, it is found that they have become much more frequent and of decidedly shorter duration.

Present Condition.—There has been some change in the course of the attacks, as will be seen from a comparison of her condition in 1902 with that of 1908 (Charts 5 and 6).[1] Formerly, there was little evidence of the stupor which is now so marked. At the onset, which is sudden, abrupt and unheralded, occurring in the early morning usually, there is wild psychomotor excitement; this after a few days, gives way to a mixed state of alternating excitement and stupor, which is, in turn, replaced by a condition of stupor of varying intensity, from which she emerges to her "normal" state.

The section of Chart 5 best showing a characteristic cycle, is that beginning March 6, for ten days, uniform excitement, then a similar duration of the mixed phase, this being succeeded by a period in which stupor of varying depth was present, and followed by "normal."

Chart 6 shows a condition of almost uninterrupted excitement throughout the entire "abnormal" phase. The excitement is of a high degree—laughing, singing, shouting, screaming, swearing, grimacing and gesticulating. Her speech is incoherent, often but a jargon of unintelligible

[1] Charts 5 and 6 were necessarily made by different nurses, but each chart was made by the same individual throughout. In gathering data for Chart 5, the stimulus was, so far as possible, on all occasions the same. The nurse entered the patient's room and silently observed her for five minutes, then approached the bed and raised the patient's arm. At each observation, points common to this patient were noted, viz., whether she was laughing, shouting, screaming, singing or whistling, or whether she was mute, aggressive, passive or resistive, and from these collectively, the degree of elevation above, or of depression below, the "normal line" was judged. The circles indicate that she was sleeping and are placed on the same lines, it being considered that she was in the same condition as when last awake.

sounds, and often showing a marked tendency to stereotyped repetition. The attitude is one of aggressiveness and violence. She may be obscene, abusive, vulgar and threatening; often becoming even within the next moment, playful, erotic and affective. During this phase, her attention may be gained momentarily and she will often interpolate into her jargon, words spoken in her presence and occasionally will make pertinent comments on remarks which she hears. For the most part, however, she is inaccessible and is quite irrelevant, though at times she may be directed or distracted.

While blood examination was being made, during one of the excited days, the following, representing 8 minutes spontaneous production, was taken: "Sign yourself, sign yourself (laughs), nothing, nothing, nothing. Yes, you do it yourself, do it yourself. How many more? How many more of them? How many more are there? I am tired of these things (blood smears were being made)—my father took it out—eight o'clock—no, nothing. What's that in your mouth? (blood pipette). Transactions—put that in your mouth. Can you see? Who is this? I don't know. How many more is there? How much of that trash have you got there? How many more of them? I will get up on the stage. How many more of them are there? How many more? How is your stomach (laughs)? Blue flag (looking at physician's blue necktie—laughs) yes, yes, yes (laughs), good-bye (this to the nurse who leaves the room). (Q. Are you happy now?) Perfectly."

During the excited stage she sleeps but little; is entirely negligent of care of self. During the first few days, she takes but very little nourishment, frequently refusing everything. For a number of days, only fluids are taken, and lastly, meats and other solid foods. During this period she loses in weight, but gains during her "normal" phases. During the past year there has been a total gain of twenty pounds, her weight now being 123. Although no physical examination during her excited periods is possible, it may be noted that her pupils are dilated and there is a marked erythema of the nose which progressively increases during the first several days.

The second element, stupor, varies in depth. In the most intense grade, she is absolutely passive, inert and irresponsive to all stimuli. When, however, the stimulus proves sufficient, she will pass almost instantaneouly into a state of violent excitement and rage. At times, merely entering her room will cause a transition of this nature; whereas, again, it may be impossible to rouse her. The stimulus necessary is less in the middle than toward the end of the "abnormal" phase. During the stuporous phase, she sleeps the greater part of the time. Within the last two years it has been noted that often toward the end of her "abnormal" phases, there have occurred periods varying from one-half to twenty-four hours, during which she seems in her "normal" state. Following such periods, she may become excited, or relapse into the stuporous condition.

An examination while "well," reveals that she is in remarkably good

physical condition considering her mode of life. Pupils are oval, and eccentrically placed; they react normally. Dermatographic reaction is below the normal. The deep reflexes are exaggerated; cutaneous sensation is acute and normal. Even during this examination, although she is considered "well," she seems to be quite irritable and unstable, loath to be disturbed; her expression is somewhat sullen, and again, indifferent.

In her "normal" condition, she is generally accessible, affable and pleasant; attention is easy to gain and hold during ordinary conversation. There is, however, little spontaneous production and she limits herself to brief replies. She is oriented as to person and place, and quite accurately as to time. She reads the newspapers and when asked, comments with understanding, on their contents. Memory for remote events is fairly good; she knows but little of happenings during her "abnormal" phases, although she can tell, when she was last "well." Calculation is fairly accurate and quite rapidly performed. She does not say much about her illness; cannot tell when the attack is coming on. Although she says she would rather be well than as she is, her present condition leaves not the slightest trace of depression or sadness. Only when questioned, does she speak of her relatives, although quite recently she voluntarily wrote a note to one of them, requesting a visit. (It is interesting to note that the wording of this letter is almost identical with several that have been written during the past few years.) Occasionally during her "well" periods, she is distinctly below par, but not stuporous. During such times, she will answer questions but not so quickly, fully, or briskly as usual. (Such a condition is shown in Chart 5, from March 1 to 6. Also, a short period of well-marked lowering is shown in the same chart—February 8.) Both of these conditions when present, generally precede the onset of the excited phase.

As in some cases, exacerbation of the mental symptoms seems to occur with some relation to the menstrual function, this point has been carefully observed for several years past. Apparently, there is no regular association between the two, as may be seen in Chart 4.

We have here, two individuals in whom a psychosis developed during early life. Since the onset, both have been subject to recurring attacks at gradually decreasing intervals, which present many points in common. Early in the course, there were in both, periods of marked psychomotor excitement which at times were replaced by a depressed and confused condition. Hallucinations and delusions were present, disorientation was not in evidence; tendencies toward stereotypy in speech and action, neologisms, irrelevance, incongruity in affective states, with emotional dulling, purposeless resistence with a retardation amounting to stupor, during which mutism, refusal of nourishment and attention were

present, have all been prominent. As the disease progressed, the excited phases have gradually lessened in degree, at the same time, there being an increase in the duration and depth of the stupor.

During the intervals, which are here spoken of as "normal" or "well" periods, in contradistinction to the "abnormal," both patients were capable of a varying amount of mental activity; yet there is no doubt but that deterioration of an easily discernible grade obtains. With the woman, the process has been evidently of greater severity. During her "normal" periods, there is exhibited a marked degree of affect lowering—little spontaneity in thought or action is ascertainable, interest in pleasures or diversions has reached a low ebb, and contentedly remaining in bed from day to day, she declares in a lackadaisical manner that she is "perfectly happy."

With the other, the condition is somewhat different. When "well," his interest in pleasure-seeking and amusement is patent, up early in the morning and out of doors, daily perusing the newspapers or current fiction, taking part in the games with other patients, or planning with youthful delight, the details of some excursion for the morrow—all this contributing to disguise and conceal the actual mental impairment which is to be made out on closer acquaintance. Here, is seen the effect of association with the outside world—activity is continued, interest kept up and desire stimulated.

Although the initial severity of the disease process, and although the sexual element, the more generally inherent passivity and submission of the female organism, may explain partially the difference in this particular aspect of the present condition of these two patients, the question arises: Would not this man, after an existence of a number of years in a similar unstimulating environment, have exhibited as marked an affective decolorization as the woman? Are we not too prone at times to overlook the result of such an isolation in a mentally normal person? With the knowledge of the loss of this possibility of attainment, would there not be associated naturally a weakening of the desire and interest—a state of more or less intense apathetic indifference and inertia?

When we come to the question of diagnosis, in which nosologic category may these two cases be placed? There are present many

of the symptoms commonly described as part and parcel of that condition summarized by the now already overtaxed diagnosis—dementia precox. There were the early onset, with hallucinations and delusions, verbigerations, stereotypy, negativism, echolalia, neologisms, muticismus, impulsive actions, etc. Again, were noted the marked motor activity and psychic elevation, rhyming, paralogia, inaccessibility, distractibility, and sound associations. At other times, confusion and definite clouding of consciousness exists. Throughout all, memory of past events is fairly well preserved, orientation is quite accurate, with, however, a deficit in insight and judgment. At the present, one cannot miss the evident mental depreciation—want in spontaneity, defective emotional tone and more or less dissociated affective reaction.

It does not seem that any one disease entity suffices to sum up fully and accurately the status of these two patients. Therefore, they are presented as atypical psychoses, related to the dementia precox group and particularly to the catatonic variety, in which recurrent attacks, consisting of alternations between phases of varying length of excitement of a maniacal-depressive character, and stupor, persisting throughout a number of years have left the present condition of moderate deterioration noticeable principally in the affective sphere.

Explanation of Charts.

To show more in detail the relation of the temperature, blood pressure, pulse and respiration during a typical cycle, charts have been made. In Chart 1 (Case 1) the curve of blood pressure is not shown in its usual variation. Very frequently during the "abnormal" phase, it will reach 200, or higher. The respiration shows an increase in rate, although this too, like the blood pressure, is not easily demonstrable in such a chart. The temperature and pulse curves on this chart show well, the usual fluctuation seen in this patient. From November 27 to December 6, he was up and dressed and about, being considered in his "normal" state. During this time, as will be seen, his temperature was subnormal. The pulse kept within normal limits. Although the temperature curve gradually reached its highest point on December 1 and 2, from there on, again, it rose each day until, on December 7, it

passed above the normal line, and on this day he entered upon one of his " abnormal " phases. Remaining well above the normal until December 17, it gradually fell, going below normal on the 21st, the patient getting up and dressing on the 25th.

As may be seen from this small section, which is quite typical, the curves on the clinical chart show almost unbroken, wavelike changes corresponding with the mental condition. Variations are, however, noticed, which will be pointed out presently.

In Chart 2 (Case 1) an attempt has been made to show the relation existing between the changes in the blood pressure, pulse, temperature and respiration, and the blood—especially the number of leucocytes during the different phases of the cycle. This represents a daily chart; the clinical observations are those taken at 7 p. m. The heavy block lines above represent days when he was passing through an attack—" abnormal " days. No attempt to divide this into periods of exaltation or depression has been made, as his condition during the past year during his " abnormal " phases has been almost uniformly one of depression or stupor. The last two blocks connected by the two lines, differ from the usual. It was about at that time that it was decided to make daily observations of the blood condition during a complete cycle. Thinking that the " abnormal " phase was about to end, a start was made February 21. From February 25 to March 5, he was up and about and generally considered to be in his " normal " condition, although he was somewhat dull and stupid and wanting in his usual interests and energy.* It was noted during this period that his leucocyte count remained higher than usual during his " well " stages. The peculiar behavior of the temperature curve during this period is to be noted in comparison with all others. At this point it resembles more closely the curve shown in Chart 4 (Case 2).[2]

In Chart 2, the striking correspondence in the variation of the temperature curve and that representing the number of leucocytes

[2] The observations here recorded were made almost exclusively by the same nurse; this is true of all other charts. The enormous temperature variations of Charts 2 and 4 are only apparent, and due to the fact that between each two horizontal lines, there is represented only 2/10 of a degree Fahr.; whereas, with the blood pressure, pulse and respiration, the same space is worth several points.

needs not to be pointed out. It is to be noted that both curves decrease and increase somewhat before the beginning and ending of an "abnormal" phase, although variations from this rule occur, as seen in the attack beginning March 11. It may be seen from Charts 1 and 2, that some idea of the advent of an attack and also of its ending, can be formed by following the clinical charts; whereas, in Charts 3 and 4 (Case 2) no idea is given of the approaching onset, though one may expect the ending. In neither case, however, are these indications always to be relied upon.

Charts 3 and 4 (Case 2) are to be compared with similar ones in Case 1. They were made in a similar manner, with the exception that on Chart 4 the "abnormal" periods are indicated by the heavy block lines below, while the similar lines above indicate the menstrual epochs.[1] In Chart 3, it is seen that an enormous sudden and abrupt rise in all four curves takes place with the onset of the excitement. This rise is well maintained for a number of days and only gradually falls to "normal." In Chart 4, this is also shown in relation to the variation in the number of leucocytes.

On comparing similar charts in these two cases, it will be seen that there is a striking resemblance. In both, there is a rise in all of the curves at the onset of, and during the "abnormal" phase. In Case 1, the rise is more commonly a gradual one, with the exception, as had been mentioned, occurring in the period beginning February 11 (Chart 2); whereas in Case 2, the rise is as sudden as it is decided. In Case 1, these various curves barely reach normal, when they again begin to show a gradual rise, thus producing the wavelike fluctuations previously noted. In Case 2, however, during the "well" periods, the curves all remain quite uniformly normal, or slightly below; the variations in this case being more closely confined to the days while the patient is "abnormal."

Technique of Blood Examinations.—An attempt has been made to observe all of the usual precautions advised to prevent errors in blood work.

[1] As there was a marked degree of excitement in Case 2, especially at the onset, and as this might affect the various observations made, particularly the respiration and blood pressure, care was taken in each instance that after adjusting the cuff over the brachial artery, several minutes were allowed to pass before the pressure was taken. As a general rule, within this length of time she would cease struggling entirely. A Riva Rocci instrument, with a broad cuff, was used in determining all blood pressures.

As nearly as possible, the same hour was taken each day, generally in the morning. Blood was always obtained from the lobe of the ear, which had first been cleansed with alcohol. Pressure to increase the flow was never used, and several drops were allowed to escape before filling the pipette. Counting pipettes were first filled, shaken briskly a few moments and laid aside while the smears were made. Diluted acetic acid for the leucocytes, and Hayem's solution for the red blood corpuscles, were used as diluting fluids. Immediately after leaving the patient, the counting pipettes were shaken briskly for from three to five minutes, and two or three drops allowed to escape in each instance, before a drop was placed on the counting chamber. The same pipettes and counting chambers (Thoma-Zeiss, with Türk ruling) were always used. Two preparations were always counted, and with the leucocytes, the total number in 1 cmm., with the red blood corpuscles, 1/20 cmm. was counted. A Sahli hemoglobinometer which had been standardized against a Miescher instrument was used. Immediately after filling the pipettes, a dozen or more cover-slip smears were made at each examination. Several of the best of these were fixed by heat in the air bath for about two hours, and then stained with Ehrlich's triple mixture, the same lot of stain being used in nearly the entire work. In making the differential count, not more than 250 leucocytes were counted on a single smear. In a number of examinations, the estimate was based on 1000 cells, but in the majority, only 500 were counted as this number was found to give fairly accurate results.

Classification of Leucocytes.—As many classifications are in vogue, it was deemed advisable to describe the cells as they were classed in this work.

The granular cells offer but slight difficulty. Ehrlich's division into neutrophilic, eosinophilic and basophilic granulations has been followed. Unless stated to the contrary, the granular cells are understood to possess a polymorphous nucleus.

Concerning the non-granular, mononuclear elements of the blood, there is still considerable divergence of opinion. Here, they are divided into the following classes:

(a) Small lymphocytes; cells about the size of the average red blood corpuscle, a trifler smaller or larger. The nucleus takes up most of the cell, stains deeply with the basic colors, is generally round or oval in shape, but occasionally may present a bi-lobed, dumb-bell appearance. The cytoplasm is very small in amount and stains faintly, or not at all, with the acid or basic dyes.

(b) Large lymphocytes; cells varying in size from that of a red blood corpuscle to the polymorphonuclear leucocyte. In these, the nucleus is round or oval in shape, is proportionately larger than in the small lymphocyte and stains less intensely with the basic colors. The cytoplasm is more abundant than in the small lymphocytes and, like it, varies in staining reaction.

(c) Large mononuclear (large mononuclears and transitionals of Ehrlich; stimulation cells of Türk; non-granular myelocytes of Weil; myelo-

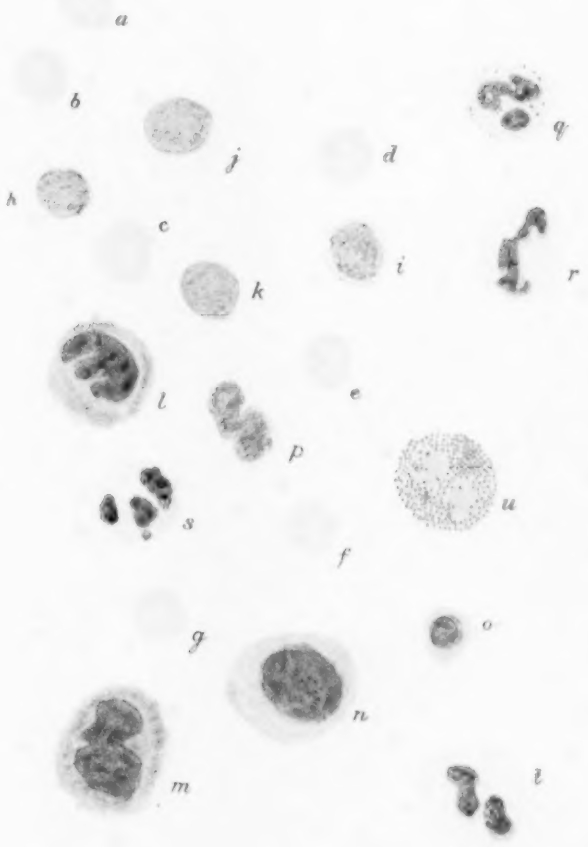

PLATE I.—(Bausch-Lomb, oc. 1, obj. 1/12 oil immer., camera lucida, Ehrlich.) *a-g*—Red blood cells. *h, i, o*—Small lymphocytes. *j, k*—Large lymphocytes. *l, m*—Transitionals. *n*—Large mononuclear. *p, q*—Basophiles. *r, s, t*—Neutrophiles. *u*—Eosinophiles.

blasts of Naegeli, etc.); cells larger than a polymorphonuclear leucocyte; the nucleus is relatively smaller than that of the large lymphocyte; in shape, oval or round, and often eccentrically placed, and staining well with basic dyes, showing more structure than the large lymphocyte nucleus. The cytoplasm is abundant and takes on basic stains with varying intensity.

(d) Transitionals; cells differing from the last, in that the nucleus presents a more varying form, due to indentations and irregularities in outline.

Between the large and small lymphocytes there occur all grades of transition. At times it is practically impossible to decide in which class the cell belongs; however, as in these two cases the larger forms have seemed to be somewhat more frequent than is usual, the attempt to separate them has been made throughout. Also, between the large mononuclears and transitionals, one may find at times, but slight differences. Any cell which has the general characteristics of a large mononuclear, but in which the nucleus is in any way indented or irregular in shape, has been classed with the transitionals. In Plate I, these various cells are shown.

(e) It has been found that a varying small percentage of all the leucocytes cannot be classified accurately, because of the poor staining reaction, or because broken up, and these have been thrown together under the heading "Unclassified." This, however, does not include cells in which pathologic changes have occurred.

Discussion of the Blood Findings, in Relation to the Clinical Condition of the Patient.

As but little work was done with the red blood cells and hemoglobin, not much importance can be attached to it. It is generally conceded that among the insane as a class, there is present a varying grade of secondary anemia. Hittorf (1), Erlenmayer (2), and Lindsay (3), among the first to do work on the blood of the insane, noted this reduction; and later, Sutherland (4) and MacPhail (5), using more accurate methods, announced the same conclusion. More recently, Winckler (6) points out the same fact, and Melvin (7) has shown that the anemia varies in intensity, according to the mode of life of the patient; those living indoors showed a lower percentage of hemoglobin and a smaller number of red blood cells than those who worked out of doors a part of the day, or who lived in tents. On the other hand, both Capps (8) in cases of paresis, and Burrows (9) in paresis and other diseases associated with convulsions, have found no especial reduction, and after convulsions, have even found a mild polycythemia, with a corresponding increase in hemoglobin. Loveland (10) finds al-

most invariably, an increase in the number of red blood cells with a correspondingly high hemoglobin value in early cases of "melancholia."

In neither of these cases was anemia present; the fresh blood showed no abnormalities, poikilocytosis was not present, and excessive variations in the size of the red blood cells were not noted; occasionally microcytes and macrocytes seemed somewhat more numerous than is normal. Also, in specimens stained by Ehrlich's method, no abnormalities were found. There were no nucleated reds.

The principal object of this study was the white blood cells. Firstly, considering the leucocytes as a class, there were found definite variations in their total number which occurred with a certain definite relationship to the condition of the patient. From the figures obtained in these two cases, I think that for them we may consider about 7000 leucocytes per cmm. as the normal number during the "well" periods. There is with the onset of the "abnormal" phase, an increase in the number of leucocytes. In Case 1, this increase is a gradual one beginning before the patient takes to his bed, and again decreasing some days before he is considered "well." As has been pointed out, this follows closely the temperature curve (Chart 2). In Case 2, however, the increase is sudden, abrupt and extensive. A similar numerical increase was found by Capps (11) and Burrows (12) immediately following seizures in paresis and other conditions.

Obviously, this sudden rise cannot be attributed to a digestion leucocytosis. Not only is it not present in relation to the taking of food, but, besides this, it persists over a too-extended period. And also, it is to be remembered that for the first few days after the onset of an "abnormal" phase, both these patients took but very little nourishment and often none at all. On this account, one might with more reason expect a reduction in the number. We know that during periods of starvation, there is a decrease in the number of leucocytes, as has been pointed out by Luciani (13); and von Limbeck (14) notes the case of a "lunatic" in whom, during a fast of several days, the white blood cells fell to 2800 per cmm. Cabot (15) does not consider that there is constantly a digestion leucocytosis in man.

The marked synchronism of the change in the temperature and the number of the leucocytes suggests that perhaps the temperature may offer some explanation. Pyrexia itself, does not seem to be sufficient. In Case 2, with pyrexia of a mild grade, the leucocyte count is found to be low (Chart 4), whereas, in Case 1, we see a subnormal temperature with the white blood cells somewhat higher than normal. This same relation was noted by Burrows (16) and by Elzholtz (17) in cases of delirium tremens. Carter (18), after a careful experimental study of leucocytosis, concludes that pyrexia itself is not a sufficient cause for the increase in the number of leucocytes.

Might this increase in the number of leucocytes be due to the exercise incident to the excitement and struggling? An increase in the number of leucocytes following exercise is known to occur, but Burrows (19) found during various convulsive seizures where an increase in the number of leucocytes occurred, that this was of two kinds: firstly, that which was due to the exercise itself and which the differential count showed to be physiologic; and secondly, that which was due in some way to the convulsion itself, and which was of the pathologic, inflammatory type. In Case 2, in all probability, the muscular activity would cause some increase in the number of cells. At times when the blood was taken, the patient struggled violently. In Case 1, however, motor-excitement is almost entirely absent at all times, and never was there the least struggling when the blood was taken. And again, it is noted that at the time when he is taking the most exercise, viz., while " well," his leucocyte counts are lowest. Fisher (20) attributes the increase in the number of leucocytes in manic-depressive-excitement, to the muscular activity alone. The high leucocyte counts shown in his tables do not seem to occur always with the presence of psychomotor activity, and generally the polymorphonuclear neutrophilic percentage is decidedly increased.

Recently, in a few experimental studies, Camus and Pagniez (21) and others have found that the height of the blood pressure may exert some influence on the number of white blood corpuscles. With a marked lowering of the blood pressure, these observers noted a concomitant decrease in the number of leucocytes, attributing this to the tendency of the white blood corpuscles to adhere

to the vessel walls during the period of lowered pressure, with the accompanying slowing of the velocity of the blood stream. The reverse of this condition, an increase of leucocytes with a high blood pressure, they were unable to state. Whether the leucocytosis in these two cases bears any causal relation to the rise in blood pressure, has not been determined. In this connection it might be noted that Gordon (22) found that athletes after prolonged exercise, show but a slight or no increase in blood pressure, provided that such exercise did not lead to extreme exhaustion through overtaxation.

In a recent communication, Hasselbalch and Heyerdahl (23) have considered a number of the physical factors which may influence the number of leucocytes in a specimen of blood taken from a certain locality. They find that variations in blood pressure bear no relation to the number of leucocytes, but that the pulse amplitude (the difference between the systolic and diastolic blood pressure) shows fluctuations which parallel the changes in the number of white blood corpuscles. They, however, have noted this in but a few cases, and until further work with more accurate methods has been carried out, they do not advance this point as an established fact. With an increase in the pulse rate resulting from variations in position, and from muscular exercise, there is a transient change in the number of leucocytes which disappear during rest, before, however, the pulse has regained its normal rate; and these observers conclude that the leucocyte variations are not due so much to the degree of the increased cardiac action *per se*, but rather to the sudden transition from a condition of complete rest to one of decided activity.

We come next to the results of the differential counts, the details of which are shown in Tables 1 and 2. Not all examinations made have been figured in these tables; a number of those which exhibited no particular variation have been omitted, and in addition to the findings during one complete cycle, only those near the transition periods are shown. Not only the percentage, but the absolute number of the various forms of leucocytes are tabulated, because, as has been pointed out by Elzholtz (24), the percentage values alone afford, if not an actually erroneous conclusion, at least at times, only partial and mayhaps, misleading deductions.

The " remarks " refer to the condition of the patient at the moment of blood examination.

In Table 1 (Case 1), the results of examinations show, firstly, that in this patient the polymorphonuclear percentage is continuously high, and although showing some fluctuations, rarely goes below 70 per cent. The lymphocytes are correspondingly decreased, the small lymphocytes, to a greater degree. The percentage number of the other forms shows no particular variation. On the day of onset of an " abnormal " phase, there occurs a marked hyperleucocytosis, and the differential count shows that there is a slight but definite increase in percentage number of polymorphonuclears, with a very decided absolute increase. The relative number of lymphocytes does not seem to change appreciably with any regularity, but the absolute number is increased. While the increase in polymorphonuclears is immediate, the rise in number of lymphocytes follows somewhat more slowly; but on the other hand, generally persists over a longer period. The observation on March 6 (Table 1), the beginning of an " abnormal " phase, shows a relative and absolute increase in polymorphonuclear cells, a relative decrease, but an absolute increase in large and small lymphocytes. Also, that the absolute lymphocytosis, although it occurs on the same day, more gradually reaches its height, and on March 10, when the polymorphonuclears have returned to " normal," the lymphocytes are still high, having shown, however, at no time, such a marked proportionate rise as the polymorphonuclears.

In Case 2 (Table 2), if the average number of white blood corpuscles of various classes is taken during the " well " and " abnormal " periods, it will be seen that there is practically no change in the percentage values. However, during the excited period, there is an absolute increase in the number of white blood corpuscles, especially due to the increase of the first few days, and during the stupor, there is a similar decrease.

At the onset of the excitement, there is found both an absolute and relative increase in polymorphonuclears, with a compensatory decrease in lymphocytes affecting small lymphocytes and large lymphocytes almost equally. There is also, a slight decrease in large mononuclears and transitionals found at this time. In Chart

to the vessel walls during the period of lowered pressure, with the accompanying slowing of the velocity of the blood stream. The reverse of this condition, an increase of leucocytes with a high blood pressure, they were unable to state. Whether the leucocytosis in these two cases bears any causal relation to the rise in blood pressure, has not been determined. In this connection it might be noted that Gordon (22) found that athletes after prolonged exercise, show but a slight or no increase in blood pressure, provided that such exercise did not lead to extreme exhaustion through overtaxation.

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We come next to the results of the differential counts, the details of which are shown in Tables 1 and 2. Not all examinations made have been figured in these tables; a number of those which exhibited no particular variation have been omitted, and in addition to the findings during one complete cycle, only those near the transition periods are shown. Not only the percentage, but the absolute number of the various forms of leucocytes are tabulated, because, as has been pointed out by Elzholtz (24), the percentage values alone afford, if not an actually erroneous conclusion, at least at times, only partial and mayhaps, misleading deductions.

The " remarks " refer to the condition of the patient at the moment of blood examination.

In Table 1 (Case 1), the results of examinations show, firstly, that in this patient the polymorphonuclear percentage is continuously high, and although showing some fluctuations, rarely goes below 70 per cent. The lymphocytes are correspondingly decreased, the small lymphocytes, to a greater degree. The percentage number of the other forms shows no particular variation. On the day of onset of an " abnormal " phase, there occurs a marked hyperleucocytosis, and the differential count shows that there is a slight but definite increase in percentage number of polymorphonuclears, with a very decided absolute increase. The relative number of lymphocytes does not seem to change appreciably with any regularity, but the absolute number is increased. While the increase in polymorphonuclears is immediate, the rise in number of lymphocytes follows somewhat more slowly; but on the other hand, generally persists over a longer period. The observation on March 6 (Table 1), the beginning of an " abnormal " phase, shows a relative and absolute increase in polymorphonuclear cells, a relative decrease, but an absolute increase in large and small lymphocytes. Also, that the absolute lymphocytosis, although it occurs on the same day, more gradually reaches its height, and on March 10, when the polymorphonuclears have returned to " normal," the lymphocytes are still high, having shown, however, at no time, such a marked proportionate rise as the polymorphonuclears.

In Case 2 (Table 2), if the average number of white blood corpuscles of various classes is taken during the " well " and " abnormal " periods, it will be seen that there is practically no change in the percentage values. However, during the excited period, there is an absolute increase in the number of white blood corpuscles, especially due to the increase of the first few days, and during the stupor, there is a similar decrease.

At the onset of the excitement, there is found both an absolute and relative increase in polymorphonuclears, with a compensatory decrease in lymphocytes affecting small lymphocytes and large lymphocytes almost equally. There is also, a slight decrease in large mononuclears and transitionals found at this time. In Chart

TABLE I.

Date.	Hour.	Number of leucocytes in 1 cmm.	Number counted differentially.	Total number in 1 cmm. / Percentage of the total number.									Remarks.
			Per cent in 1 cmm. of the total leucocytes.	Polymorphonucleears.	Large lymphocytes.	Small lymphocytes.	Large mononucleears.	Transitionals.	Eosinophiles.	Basophiles.	Unclassified.	Myelocytes.	
1907 Oct. 8	11 a.	12,360	500 4.0	10,580 85.6	791 6.4	173 1.4	49 .4	544 4.4	99 .8	99 .8	25 .2	0 0	Stupor.
" 18	2.15 p.	8,430	500 5.9	6,019 71.4	1,012 12.0	202 2.4	67 .8	759 9.0	202 2.4	50 .6	0 .0	33.7 .4	Do.
" 19	4 p.	9,360	500 5.3	6,889 73.6	898 9.6	262 2.8	112 1.2	917 9.8	243 2.6	0 .0	37 .4	0 .0	Normal first day.
Nov. 4	10.30 a.	14,380	500 3.4	11,820 82.2	978 6.8	230 1.6	57 .4	1,150 8.0	86 .6	0 .0	29 .2	57.5 .4	Abnormal first day.
" 7	10.30 a.	13,400	500 3.7	10,720 80.0	858 6.4	563 4.2	54 .4	992 7.4	80 .6	107 .8	0 .0	26.8 .2	Stupor.
" 11	10.15 a.	10,860	500 4.6	8,688 80.0	868 8.0	369 3.4	43 .4	673 6.2	195 1.8	0 .0	0 .0	21.7 .2	Do.
" 25	3.45 p.	7,920	500 6.3	6,035 76.2	681 8.6	238 3.0	32 .4	634 8.0	222 2.8	16 .2	16 .2	47.5 .6	Normal.
Dec. 2	10.15 a.	5,520	500 9.0	4,515 81.8	331 6.0	143 2.6	44 .8	386 7.0	55 1.0	33 .6	11 .2	0 .0	Do.
" 4	11.30 a.	7,282	500 6.8	5,287 72.6	874 12.0	58 .8	87 1.2	728 10.0	204 2.8	44 .6	0 .0	0 .0	Do.
" 6	10.45 a.	6,220	500 8.0	4,652 74.8	522 8.4	274 4.4	37 .6	522 8.4	149 2.4	25 .4	37 .6	0 .0	Do.
" 7	10.45 a.	11,040	500 4.5	9,053 82.0	729 6.6	177 1.6	132 1.2	1,060 9.6	0 .0	66 .6	44 .4	0 .0	Abnormal psychic elevation.
" 10	5 p.	9,820	500 5.4	8,052 82.0	844 8.6	255 2.6	39 .4	511 5.2	98 1.0	0 .0	18 .2	0 .0	Stupor.
" 18	3.45 p.	6,560	500 7.6	4,763 72.2	577 8.8	210 3.2	39 .6	840 12.8	105 1.6	39 .6	0 .0	0 .0	Do.

1907 Dec. 26	10.45 a.	5,984	500 8.3	4,571 76.4	610 10.2	263 4.4	24 .4	383 6.4	96 1.6	12 .2	12 .2	11.9 .2	Normal.
1908 Jan. 13	11.30 a.	10,640	500 4.6	9,023 84.8	553 5.2	298 2.8	42 .4	638 6.0	0 .0	64 .6	0 .0	20.1 .2	Abnormal.
" 30	11.30 a.	8,096	500 6.1	6,671 82.4	469 5.8	97 1.2	32 .4	648 8.0	129 1.6	32 .4	16 .2	0 .0	Confused.
Feb. 11	4.15 p.	13,400	500 3.7	10,479 78.2	1,367 10.2	241 1.8	107 .8	1,018 7.6	107 .8	.0 .0	54 .4	26.8 .2	Stupor.
" 21	4.45 p.	10,776	500 4.6	8,578 79.6	733 6.8	194 1.8	21 .2	797 7.4	388 3.6	43 .4	21 .2	0 .0	Do.
" 22	2.30 p.	10,780	500 4.6	8,775 81.4	453 4.2	172 1.6	65 .6	905 8.4	345 3.2	43 .4	.0 .0	21.5 .2	Do.
" 23	10.30 a.	12,660	500 3.9	10,508 83.0	734 5.8	228 1.8	76 .6	709 5.6	253 2.0	101 .8	25 .2	25.3 .2	Do.
" 24	2 p.	9,340	500 5.3	7,696 82.4	448 4.8	149 1.6	37 .4	654 7.0	205 2.2	75 .8	19 .4	37.5 .4	Confused.
" 25	2.15 p.	9,740	500 5.1	7,948 81.6	487 5.0	234 2.4	39 .4	740 7.6	234 2.4	39 .4	19 .2	0 .0	Normal.
" 26	10.30 a.	10,080	500 4.9	7,963 79.0	605 6.0	262 2.6	20 .2	826 8.2	282 2.8	40 .4	0 .0	80.6 .8	Do.
" 27	10 a.	7,140	500 7.0	5,683 79.6	500 7.0	328 4.6	28 .4	357 5.0	114 1.6	14 .2	0 .0	9.9 1.4	Normal; 1 eosinophile myeloc.
" 28	10.30 a.	8,120	500 6.1	6,658 82.0	552 6.8	179 2.2	32 .4	536 6.6	81 1.0	0 .0	0 .0	48.7 .6	Normal.
" 29	10 a.	9,480	500 5.2	7,944 83.8	720 7.6	152 1.6	38 .4	384 5.0	19 .2	95 1.0	0 .0	37.8 .4	Do.
Mar. 1	10 a.	8,060	500 6.2	6,883 85.4	500 6.2	129 1.6	48 .6	258 3.2	129 1.6	16 .2	0 .0	96.7 1.2	Do.
" 2	10 a.	8,100	500 6.1	6,707 82.8	551 6.8	113 1.4	16 .2	535 6.6	113 1.4	65 .8	0 .0	65.0 .8	Do.
" 3	2.15 p.	7,900	1,000 12.6	5,656 71.5	916 11.2	490 4.4	32 .7	537 9.2	126 1.7	32 .4	0 .1	15.8 .2	Normal; 1 eosinophile myeloc.
" 4	10 a.	8,480	1,000 11.7	.... 85.5	.... 5.2	.... 2.4	7	.... 4.2	.... 1.4	4	0	0 .0	Normal.

TABLE I.—*Continued.*

Date.	Hour.	Number of leucocytes in 1 cmm.	Number counted differentially.	Total number in 1 cmm. / Percentage of the total number.									Remarks.
			Per cent in 1 cmm. of the total leucocytes.	Polymorphonuclears.	Large lymphocytes.	Small lymphocytes.	Large mononuclears.	Transitionals.	Eosinophiles.	Basophiles.	Unclassified.	Myelocytes.	
1908 Mar. 5	9.30 a.	7,420	500 6.7	6,069 81.8	549 7.4	119 1.6	44 .6	475 6.4	89 1.2	15 .2	0 .0	29.6 .4	Stupid.
" 6	10 a.	11,380	500 4.3	9,627 84.6	614 5.4	296 2.6	22 .2	660 5.8	45 .4	91 .8	23 .2	0 .0	Do.
" 7	9.45 a.	11,120	500 4.4	9,230 83.0	867 7.8	178 1.6	156 1.4	689 6.2	22 .2	67 .6	0 .0	22 .2	Do.
" 8	9.45 a.	11,040	500 4.5	9,450 85.6	729 6.6	243 2.2	66 .6	464 4.2	88 .8	0 .0	0 .0	0 .0	Do.
" 9	9.45 a.	9,460	500 5.2	7,435 78.6	700 7.4	189 2.0	76 .8	832 8.8	113 1.2	113 1.2	0 .0	0 .0	Do.
" 10	8.30 a.	9,394	500 5.3	6,782 72.2	751 8.0	338 3.6	94 1.0	1,202 12.8	150 1.6	56 .6	19 .2	0 .0	Do.
" 11	10 a.	8,520	500 5.8	6,952 81.6	647 7.6	136 1.6	34 .4	630 7.4	170 2.0	17 .2	0 .0	0 .0	Do.
" 12	10 a.	8,272	500 6.0	6,733 81.4	711 8.6	215 2.6	33 .4	446 5.4	99 1.2	33 .4	0 .0	0 .0	Do.
" 13	9.45 a.	9,140	500 5.4	7,714 84.4	493 5.4	110 1.2	55 .6	567 6.2	146 1.6	18 .2	18 .2	18 .2	Do.
" 14	9.30 a.	8,260	500 7.1	5,874 84.4	529 7.6	83 1.2	28 .4	278 4.0	223 3.2	42 .6	0 .0	0 .0	Do.
" 15	9.45 a.	6,900	500 7.2	5,644 81.8	497 7.2	166 2.4	14 .2	290 4.2	276 4.0	14 .2	0 .0	0 .0	Do.
" 16	10 a.	8,600	500 5.8	7,000 81.4	654 7.6	258 3.0	52 .6	413 4.8	172 2.0	52 .6	0 .0	0 .0	Do.
" 17	8.30 a.	6,604	500 7.5	5,442 82.4	383 5.8	158 2.4	26 .4	357 5.4	224 3.4	13 .2	0 .0	0 .0	Do.

1908 Mar. 18	9.45 a.	8,560	500 5.8	7,242 84.6	496 5.8	205 2.4	68 .8	359 4.2	137 1.6	34 .4	0 .0	17 .2	Stupid.
" 19	9.45 a.	7,980	500 6.2	6,559 82.2	495 6.2	287 3.6	16 .2	303 3.8	271 3.4	16 .2	0 .0	16 .2	Do.
" 20	9.30 a.	6,800	500 7.3	5,576 82.0	381 5.6	190 2.8	27 .4	286 4.2	272 4.0	54 .8	14 .2	0 .0	Do.
" 21	9.30 a.	6,732	500 7.4	5,466 81.2	390 5.8	148 2.2	54 .8	458 6.8	161 2.4	40 .6	13 .2	0 .0	Somewhat less stupid.
" 22	9.45 a.	7,020	500 7.1	5,616 80.0	407 5.8	295 4.2	42 .6	435 6.2	196 2.8	28 .4	0 .0	0 .0	Up and dressed; mute.
" 23	9.30 a.	5,940	500 8.4	4,633 78.0	570 9.6	154 2.6	71 1.2	261 4.4	166 2.8	59 1.0	0 .0	23.7 .4	Do.
" 24	8.15 a.	5,610	1,000 17.8	3,776 67.3	774 13.8	331 4.9	73 1.3	482 8.6	281 4.0	45 .8	0 .0	33.6 .6	Normal.
" 25	9.30 a.	6,600	500 7.5	5,148 78.0	502 7.6	304 4.6	26 .4	343 5.2	185 2.8	53 .8	13 .2	26 .4	Do.
" 26	9.45 a.	7,180	500 6.9	5,715 79.6	617 8.6	215 3.0	29 .4	393 5.2	201 2.8	14 .2	0 .0	14 .2	Do.
" 27	9.45 a.	7,100	500 7.0	5,879 82.8	611 8.6	43 .6	28 .4	398 5.6	85 1.2	43 .6	0 .0	14.2 .2	Do.
" 28	9.45 a.	6,292	500 7.9	5,197 82.6	378 6.0	101 1.6	50 .8	315 5.0	214 3.4	25 .4	0 .0	12.5 .2	Do.
" 29	9.45 a.	5,800	500 8.6	4,791 82.6	394 6.8	255 4.4	16 .2	197 3.4	104 1.8	23 .4	0 .0	23 .4	Drowsy and stupid.
" 30	9.20 a.	6,100	500 8.1	4,575 75.0	781 12.8	85 1.4	61 1.0	439 7.2	122 2.0	37 .6	0 .0	0 .0	Normal.
" 31	8.15 a.	7,060	500 7.0	5,577 79.0	508 7.2	311 4.4	14 .2	325 4.6	226 3.2	85 1.2	0 .0	14 .2	Do.
Apr. 1	9.45 a.	7,620	500 6.5	6,431 84.4	305 4.0	107 1.4	91 1.2	579 7.6	61 .8	15 .2	30 .4	0 .0	Do.
" 2	9.30 a.	7,900	500 6.3	6,083 77.0	853 10.8	158 2.0	79 1.0	411 5.2	0 .0	253 3.2	47 .6	15.8 .2	Restless and uneasy, though normal.
" 3	9.30 a.	16,640	500 3.0	13,745 82.6	1,198 7.2	300 1.8	166 1.0	1,231 7.4	0 .0	0 .0	0 .0	0 .0	Abnormal, resistive.

TABLE II.

Date.	Hour.	Number of leucocytes in 1 cmm.	Number counted differentially.	Total number in 1 cmm. / Percentage of the total number.									Remarks.
			Per cent in 1 cmm. of the total leucocytes.	Polymorphonuclears.	Large lymphocytes.	Small lymphocytes.	Large mononuclears.	Transitionals.	Eosinophiles.	Basophiles.	Unclassified.	Myelocytes.	
1907 Oct. 17	10.30 a.	12,180	500 4.1	8,963 73.6	1,462 12.0	658 5.4	97 .8	770 6.4	49 .4	146 1.2	24 .2	0 .0	
" 19	2 p.	19,660	500 2.5	15,374 78.2	2,084 10.6	944 4.8	39 .2	1,101 5.6	0 .0	79 .4	39 .2	39 .2	Excited since 6.30 a. m.
" 22	12 n.	13,100	500 3.8	7,572 57.8	2,725 20.8	812 6.2	79 .6	1,520 11.6	157 1.2	183 1.4	52 .4	0 .0	Excited, struggling; no nourishment.
" 25	2.30 p.	13,550	500 3.6	7,209 53.2	2,846 21.0	1,599 11.8	81 .6	1,409 10.4	298 2.2	136 1.0	0 .0	0 .0	Do.
" 31	10.30 a.	10,160	500 4.8	5,547 54.6	2,438 24.0	711 7.0	61 .6	102 10.0	264 2.6	61 .6	61 .6	0 .0	Mute and stuporous.
Nov. 6	10 a.	8,620	500 5.8	5,379 62.4	1,638 19.0	517 6.0	52 .6	517 6.0	103 1.2	52 .6	17 .2	0 .0	Do.
" 9	12 n.	14,440	500 3.4	9,617 66.6	2,282 15.8	1,011 7.0	87 .6	1,213 8.4	29 .2	173 1.2	29 .2	0 .0	Excited.
" 11	11.15 a.	11,240	500 4.4	8,070 71.8	1,619 14.4	495 4.4	90 .8	877 7.8	22 .2	67 .6	0 .0	0 .0	Mute, stuporous.
" 14	11 a.	7,980	500 6.2	4,596 57.6	1,676 21.0	702 8.8	48 .6	878 11.0	16 .2	32 .4	32 .4	0 .0	Do.
" 18	2 p.	7,220	500 6.9	4,577 63.4	1,083 15.0	635 8.8	43 .6	693 9.6	130 1.8	58 .8	0 .0	0 .0	Normal.
" 27	10 a.	7,280	500 6.8	4,907 67.4	1,121 15.4	364 5.0	44 .6	73 10.0	58 .8	44 .6	15 .2	0 .0	Do.
" 28	10.30 a.	15,160	500 3.2	11,249 74.2	2,213 14.6	728 4.8	121 .8	788 5.2	0 .0	61 .4	0 .0	0 .0	Excited since 5 a. m.
Dec. 8	11.30 a.	6,400	500 7.8	4,531 70.8	870 13.6	141 2.2	77 1.2	653 10.2	90 1.4	26 .4	13 .2	0 .0	Mute and stupid.

1907 Dec. 14	10.45 a.	6,760	500 7.3	4,867 72.0	717 10.6	419 6.2	27 .4	622 9.2	68 1.0	14 .2	27 .4	0 .0	Deep stupor.
" 15	10.15 a.	7,160	500 6.9	4,955 69.2	945 13.2	358 5.0	72 1.0	687 9.6	86 1.2	43 .6	14 .2	0 .0	Normal.
" 27	10.15 a.	11,240	500 4.4	8,745 77.8	1,191 10.6	517 4.6	22 .2	674 6.0	0 .0	90 .8	0 .0	0 .0	Mild excitement.
1908 Jan. 30	4 p.	6,640	1,000 15.1	3,980 60.3	1,564 23.7	350 5.3	73 1.1	383 5.8	125 1.9	40 .6	103 1.3	0 .0	Normal; sitting in chair.
" 31	2.30 p.	6,908	1,000 14.4	4,464 64.7	987 14.3	435 6.3	55 .8	711 10.3	83 1.2	48 .7	117 1.7	0 .0	Do.
Feb. 1	11 a.	6,440	1,000 15.6	4,064 63.5	998 15.6	461 7.2	51 .8	672 10.5	45 .7	38 .6	70 1.1	6.4 .1	Do.
" 2	10.30 a.	6,320	750 11.9	4,265 67.7	756 12.0	302 4.8	57 .9	712 11.3	95 1.5	50 .8	57 .9	0 .0	Do.
" 3	10.30 a.	6,640	1,000 15.1	4,323 65.5	917 13.9	277 4.2	106 1.6	832 12.6	53 .8	26 .4	66 1.0	0 .0	Do.
" 4	2.30 p.	6,100	1,000 16.3	3,318 54.4	1,183 19.4	421 6.9	128 2.1	866 14.2	43 .7	43 .7	98 1.6	0 .0	Do.
" 5	10.30 a.	5,920	1,000 16.9	3,711 62.9	861 14.6	301 5.1	65 1.1	785 13.3	35 .6	59 1.0	71 1.2	11.8 .2	Do.
" 6	11.15 a.	6,640	1,000 15.1	4,006 60.7	1,089 16.5	370 5.6	125 1.9	818 12.4	46 .7	40 .6	106 1.6	0 .0	Do.
" 7	10.15 a.	6,360	1,000 15.6	4,830 60.8	1,046 16.6	328 5.2	95 1.5	825 13.1	69 1.1	38 .6	63 1.0	6.3 .1	Do.
" 8	9.45 a.	6,560	1,000 15.1	3,744 57.6	1,151 17.7	371 5.7	143 2.2	878 13.5	117 1.8	46 .7	46 .7	6.5 .1	Do.
" 9	10 a.	14,580	1,000 6.7	11,020 76.0	1,798 12.4	421 2.9	87 .6	899 6.2	29 .2	102 .7	145 1.0	0 .0	Excited since 1 a. m.
" 10	10.40 a.	14,160	1,000 7.0	9,898 70.2	1,607 11.4	747 5.3	99 .7	1,202 9.8	113 .8	85 .6	127 .9	42.4 .3	1 eosinophile myeloc.; excited.
" 11	3.20 p.	8,200	1,000 12.1	4,895 59.7	1,533 18.7	467 5.7	90 1.1	935 11.4	131 1.6	49 .6	98 1.2	0 .0	Excited.
" 12	10 a.	9,040	1,000 11.1	5,868 65.2	1,431 15.9	486 5.4	108 1.2	981 10.9	36 .4	45 .5	36 .4	9.0 .1	Do.

TABLE II.—*Continued.*

Date.	Hour.	Number of leucocytes in 1 cmm.	Number counted differentially.	Total number in 1 cmm. / Percentage of the total number.									Remarks.
			Per cent in 1 cmm. of the total leucocytes.	Polymorphonucleears.	Large lymphocytes.	Small lymphocytes.	Large mononucleears.	Transitionals.	Eosinophiles.	Basophiles.	Unclassified.	Myelocytes.	
1908 Feb. 13	10 a.	7,760	1,000 12.8	4,289 55.7	1,571 20.4	562 7.3	77 1.0	1,001 13.0	69 .9	77 1.0	46 .6	7.7 .1	Excited.
" 14	10 a.	6,468	1,000 15.3	3,578 55.9	1,344 21.0	410 6.4	83 1.3	762 11.9	115 1.8	77 1.2	32 .5	0 .0	Do.
" 15	10.30 a.	5,980	1,000 16.6	3,457 58.6	1,257 21 3	384 6.5	77 1.3	578 9.8	83 1.4	18 .3	41 .7	5.9 .1	Do.
" 16	10 a.	5,580	1,000 17.8	3,113 56.6	1,194 21.7	242 4.4	66 1.2	759 13.8	50 .9	33 .6	44 .8	0 .0	Do.
" 17	10.15 a.	5,830	1,000 17.2	3,358 57.9	1,114 19.2	342 5.9	99 1.7	667 11.5	87 1.5	46 .8	87 1.5	0 .0	Resistive and stupid.
" 18	2 p.	6,820	1,000 14.7	4,379 64.4	1,081 15.9	469 6.9	46 .8	707 10.4	34 .5	34 .5	34 .5	0 .0	Excited.
" 19	10.30 a.	5,800	1,000 16.9	3,631 62.6	972 17.1	377 6.5	64 1.1	621 10.7	52 .9	23 .4	41 .7	0 .0	Stupor.
" 20	10.15 a.	5,900	500 8.5	3,564 60.4	968 16.4	342 5.8	47 .8	838 14.2	35 .6	47 .8	59 1.0	0 .0	Do.
" 21	10.30 a.	6,666	1,000 14.9	4,059 61.5	1,122 17.0	482 7.3	59 .9	700 10.9	86 1.3	53 .8	20 .3	0 .0	Do.
" 22	10.15 a.	6,220	1,000 16.1	4,111 66.3	992 16.0	267 4.3	43 .7	688 11.1	56 .9	19 .3	19 .3	6.2 .1	Excited and violent.
" 23	1 p.	4,564	1,000 21.7	2,282 50.7	1,017 22.6	531 11.8	45 1.0	527 11.7	63 1.4	18 .4	18 .4	0 .0	Normal at 12.45 p. m.; sitting in chair.
" 24	10.15 a.	7,280	1,000 13.6	4,594 63.8	1,058 14.7	461 6.4	50 .7	950 13.2	50 .7	14 .2	22 .3	0 .0	Normal.

2, February 9, these changes are shown; and it is also seen that the disturbance lasts but a short time, two days here, when, although the white blood corpuscles are still somewhat higher, the various percentages have resumed the proportions existing before the onset of the excitement. During this excited phase, although the percentage of large lymphocytes and small lymphocytes is decreased, the absolute number is increased. That this is not a constant variation may be seen from the examination of November 9, when the increase in both the percentage and absolute number of mononuclears is very decided, whereas the polymorphonuclears are only slightly increased. From other examinations shown in this chart, it will be seen that the polymorphonuclear leucocytosis when

Condition.	Total no. W. B. C.	P. m. n.	L. L.	S. L.	L. M.	Tr.	Eosin.	Baso.	Unclassed.
Normal. Jan. 30–Feb. 8. 10 days	6456.8	4072.5	1055.2	361.6	89.8	748.2	71.1	42.8	79.7
		61.8%	16.4%	5.6%	1.4%	11.7%	1.1%	.67%	1.2%
Excitement predominant. Feb. 9–16. 8 days	8971.0	5764.7	1466.8	477.3	85.8	900.8	78.2	60.7	71.1
		62.2%	17.8%	5.4%	1.0%	10.8%	1.0%	0.68%	0.76%
Stupor predominant. Feb. 17–22. 6 days	6216.0	3850.3	1041.5	379.6	59.6	703.5	58.3	37.0	43.3
		62.1%	16.9%	6.1%	1.0%	11.4%	0.9%	0.6%	0.7%

it occurs, is but transient, and soon gives way to the more persistent lymphocytosis. This was noted in Case 1, and would seem to be in accord with Burrows' (25) findings in various types of convulsions, as has been noted previously. Tornow (26) finds that after continued exertion (forced marches of soldiers), the leucocytosis occurring is mostly due to a polymorphonuclear increase; whereas, Hasselbalch and Heyerdahl (27) show that short periods of exercise induce an increase in the mononuclear elements. It seems then, from these and my own findings, that exercise alone, would not be sufficient to explain the sudden increase in white blood corpuscles, particularly at the beginning of the excitement when the polymorphonuclears are higher, although it may suffice to explain, in part, the more persistent increase in the mononuclear elements.

The observation recorded February 23 (Table 2) is interesting, in that it tends to be in accord with the observations of Hasselbalch and Heyerdahl regarding "static" leucocytosis. A few hours before this examination, the patient was in a stuporous condition, and the blood examination then showed no change from that of the preceding day. When this examination was made, she had been seated in a chair for several minutes, having shortly before become "well." The hypoleucocytosis with decrease in polymorphonuclears, and increase in lymphocytes, is quite definite. The following day this had entirely disappeared. As no intervening examinations were made, it is impossible to say how long this persisted, although the observers mentioned above, point out that the disturbance is but transient.

The transitionals show a uniformly high percentage, although not outside the limits for normal. A slight decrease (per cent) may occur at the time of the excitement with an absolute increase. The large mononuclears show but little change, and the eosinophiles keep well to the lower limits of normal; and on three occasions, with the first day of excitement, disappeared entirely (October 19, November 28, and December 27—Chart 2), and with the onset of the attacks of November 9 and February 9, they decreased both absolutely and relatively. With the basophilic cells, no constant variation is to be noted.

Mononuclear granular cells have been seen in specimens from both of these patients. The granulations have taken the eosinophilic or neurophilic stains. In only one or two instances has the size been excessive, generally only about that of the ordinary polymorphonuclear cell. They have been classed in the tables as myelocytes. Pollitzer (28) has called attention to the fact that the definition of a myelocyte as proposed by Türk (29) may not be so simple in its application when a poor nuclear stain, such as Ehrlich's, is employed because with this stain there are a number of polymorphonuclear cells which will appear to have a single nucleus and Pollitzer thinks the five per cent of mononuclear neutrophiles found by Arneth (30) in normal blood are discoverable only when a poor nuclear stain is used. In view of this doubt of the actual existence of these cells not much importance is to be attributed to their presence here.

The basophilic cells, the granulations of which with the Ehrlich method ordinarily remain unstained, occasionally show a few scattered large granules staining a deep reddish purple. These granules are very similar to those seen in these cells when the Jenner or Hasting stains are used.

So far, then, there has been found no one cause, or aggregate of causes, which will entirely and satisfactorily explain the blood changes which have been observed in connection with the cyclic variations occurring in the clinical condition of these patients. There is one factor remaining which has not been considered—have we here the evidence of some chemotactic substance circulating in the blood and acting to produce a hyperleucocytosis, and if so, what is its nature? One may postulate a micro-organismal invasion, a toxin or toxins resulting from a bacterial infection or from disorders of some general or particular metabolic process, or, a combination of all of these factors may be active.

Sweeping general conclusions from observations on two cases are not permissible. All that can be said, is

(1) That a hyperleucocytosis has been noted in these patients, coincident with the onset of the " abnormal " phases, and,

(2) That, so far as this work has gone, no fully satisfactory explanation for this variation has presented itself.

It was early suggested in this work, that anomalies of metabolism might possibly throw some light on the condition existing in these two patients; and consequently, hoping that something might be learned from an examination carried on from this point of view, such work is now in progress in this laboratory.

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27. Hasselbalch and Heyerdahl: Loc. cit.
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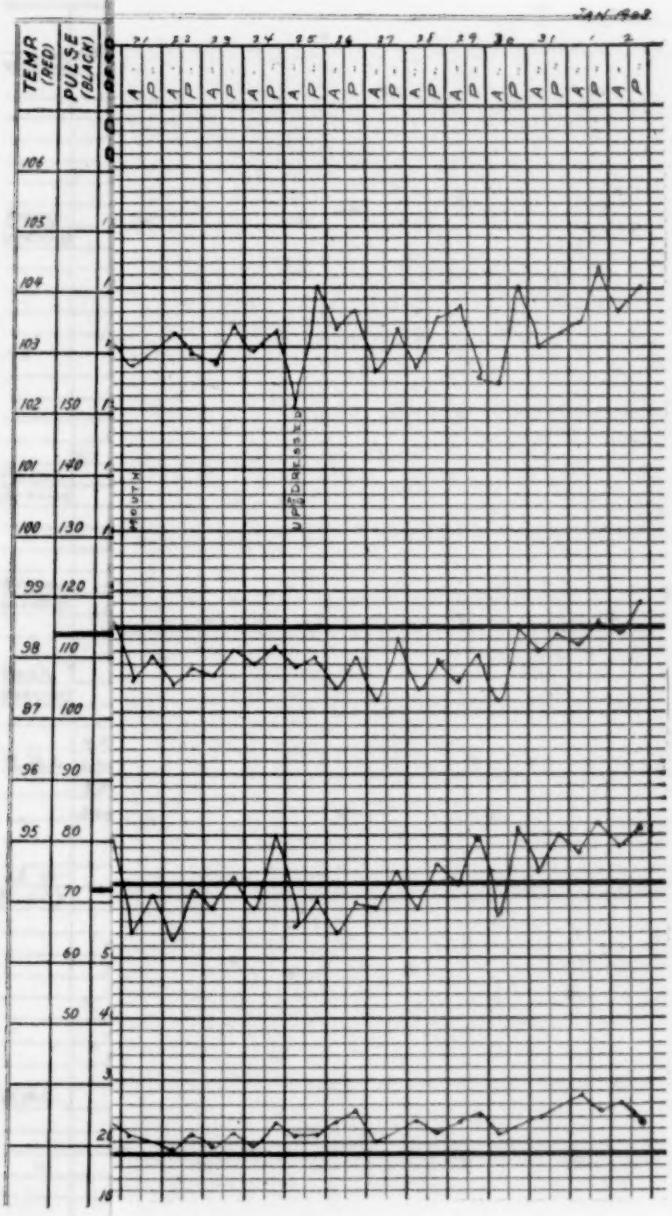
30. Arneth: Ibid.


JAN. 1902
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PULSE (BLACK)
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10. Loveland: N. Y. I
11. Capps: Loc. cit.
12. Burrows: Loc. cit.
13. Luciani: Cited by (
14. von Limbeck: Clin.
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15. Cabot: Osler's Mod
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16. Burrows: Loc. cit.
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18. Carter: Univ. Med.
19. Burrows: Loc. cit.
20. Fisher: Amer. Jour.
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22. Gordon: Edin. Med.
23. Hasselbalch and Heye
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24. Elzholtz: Loc. cit.
25. Burrows: Loc. cit.
26. Tornow: Inaug. Diss
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29. Türk.: Folia Hematol.
30. Arneth: Ibid.

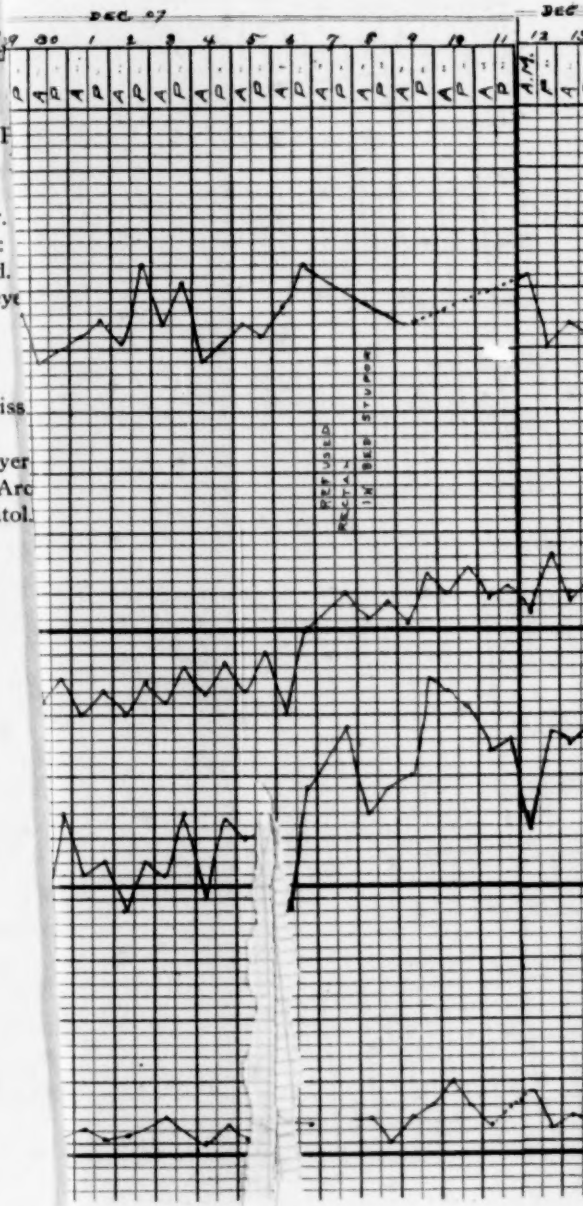
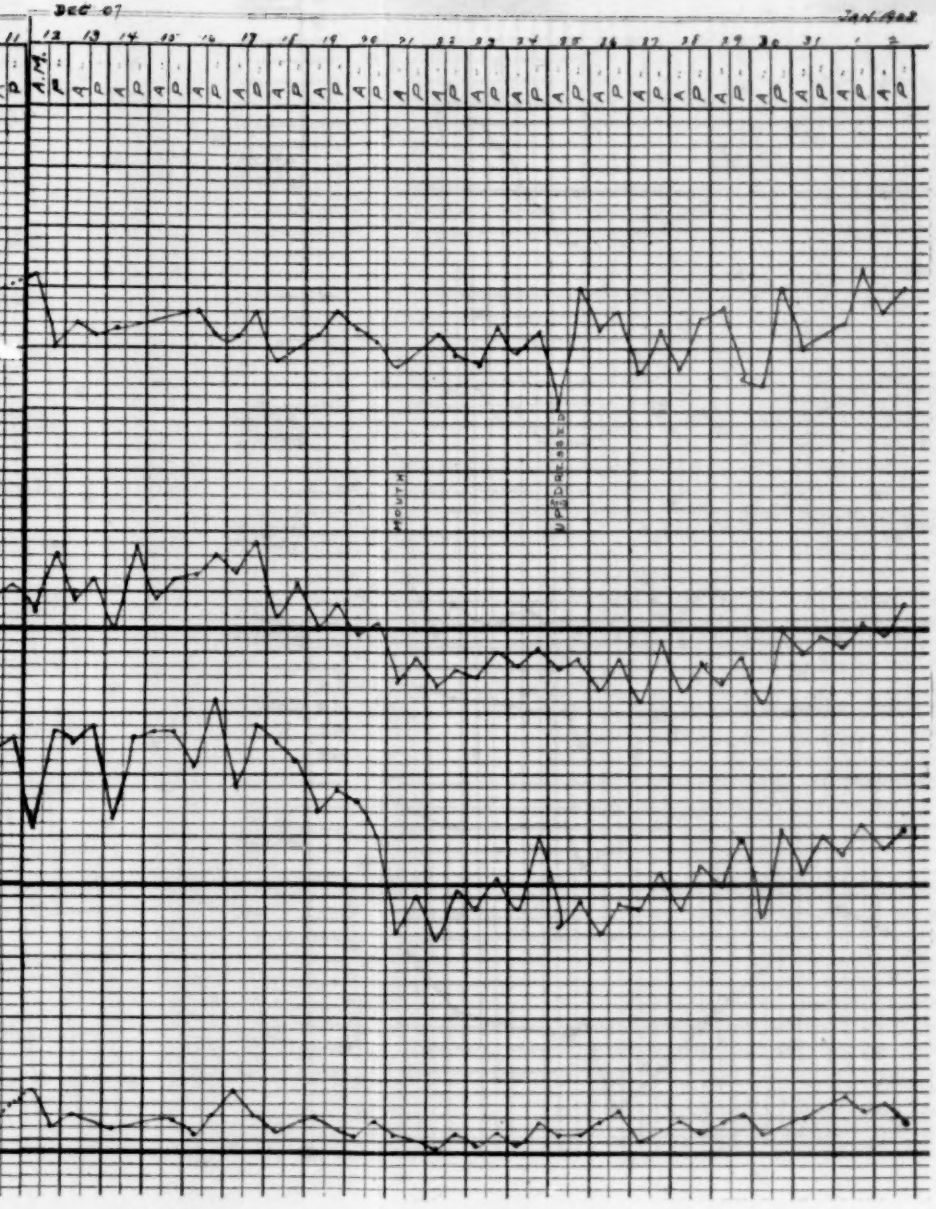


CHART 1.



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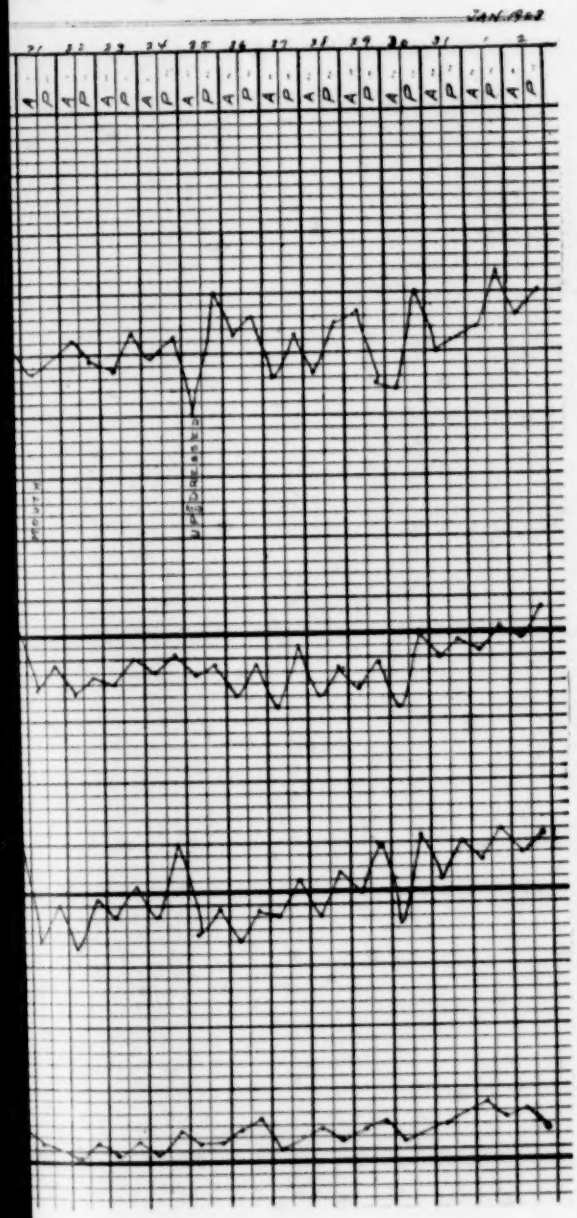
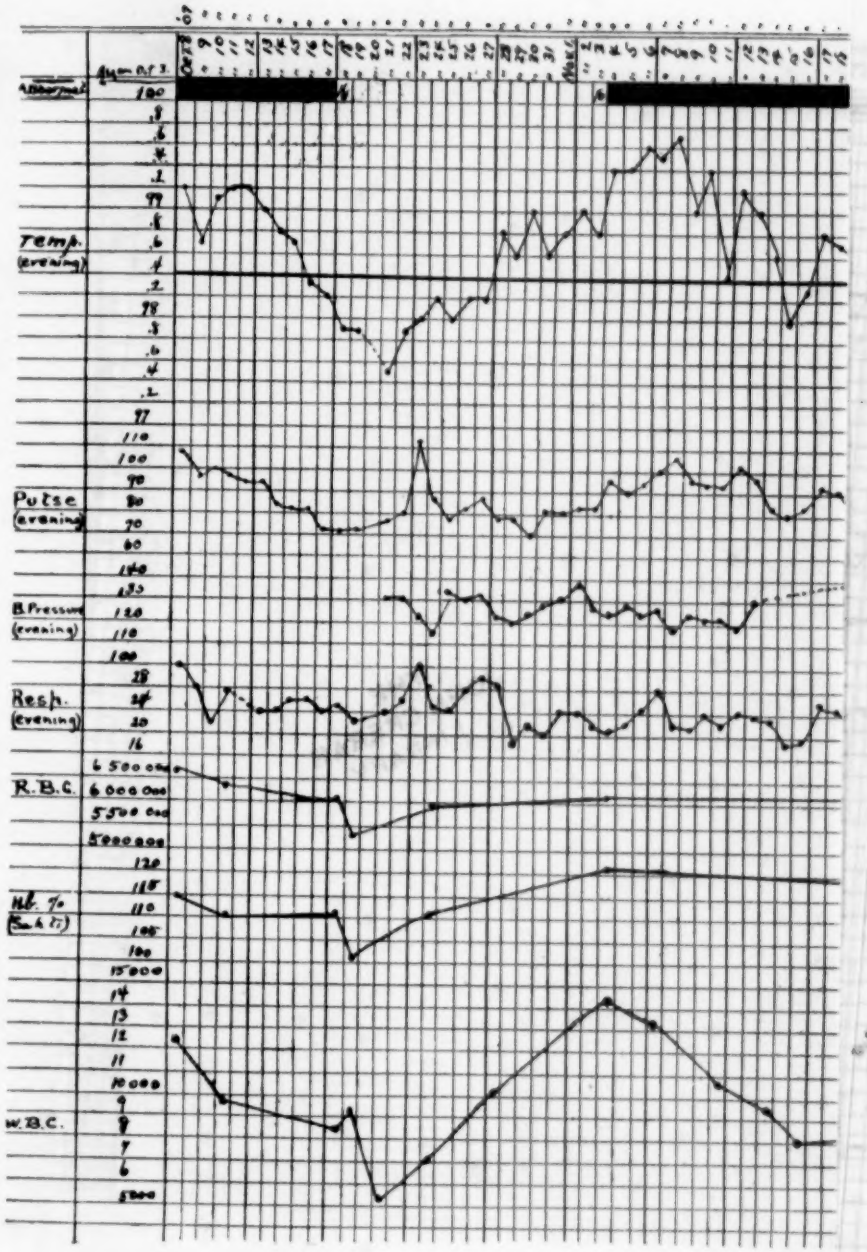
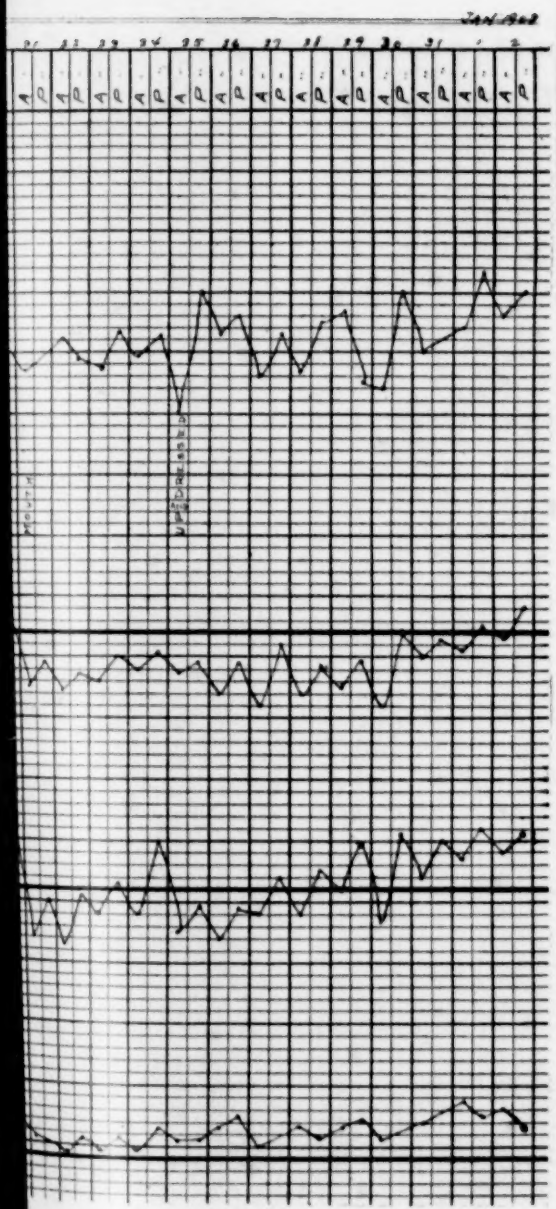


THE
JOHN CRERAR


Abnormal
Temp. (evening)
Pulse (evening)
B. Pressure (evening)
Resp. (evening)
R.B.C.
Hb. % (Sahli)
W.B.C.



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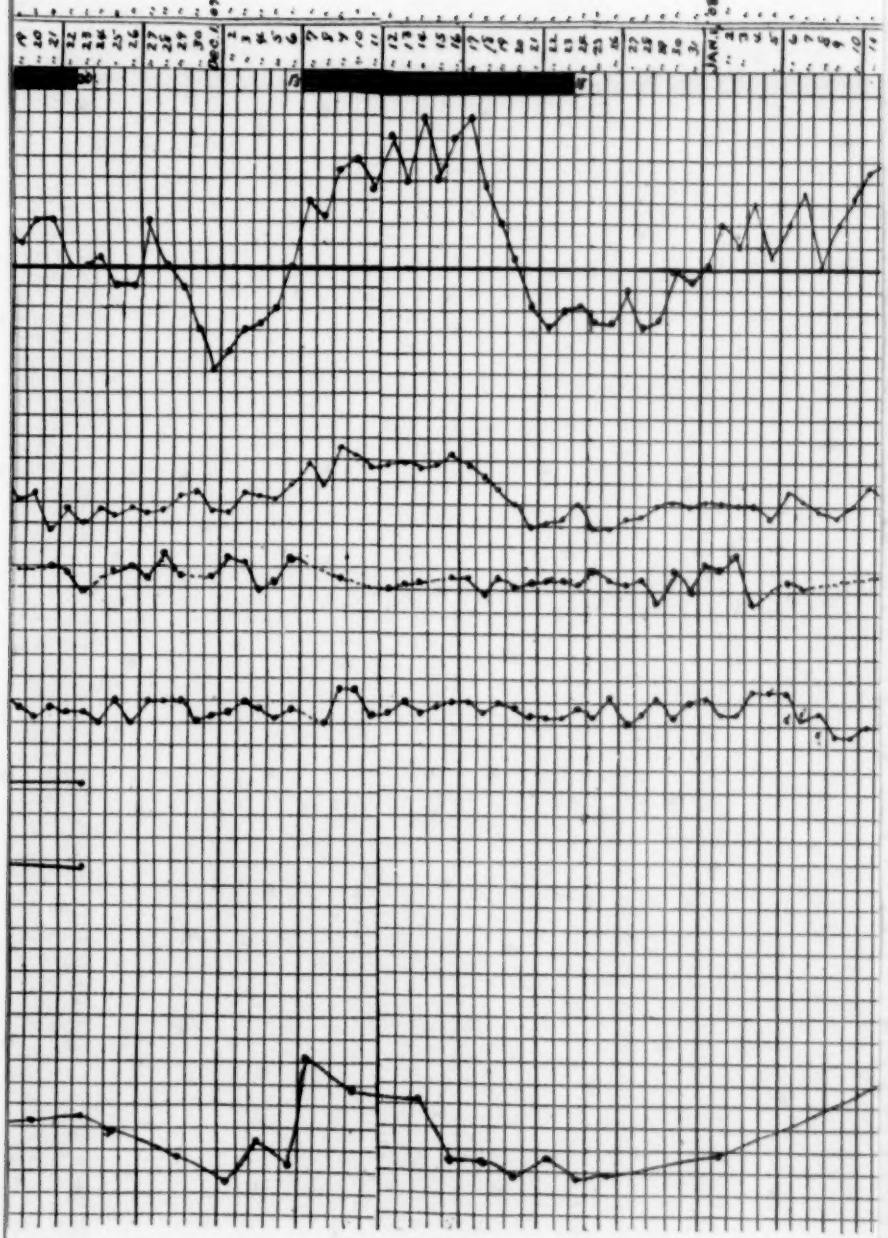

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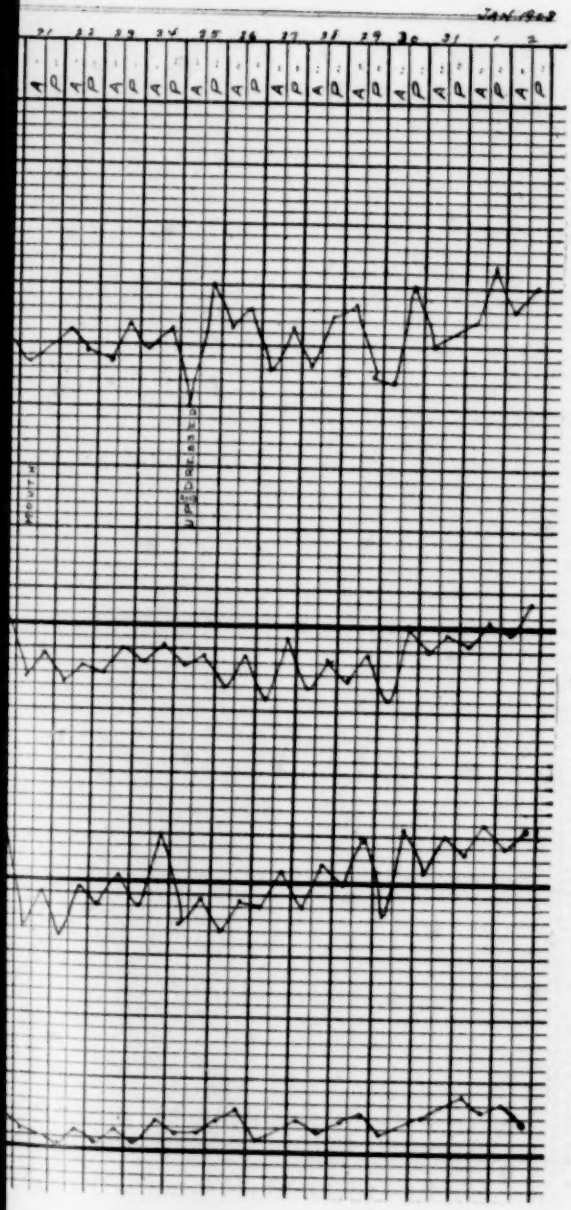
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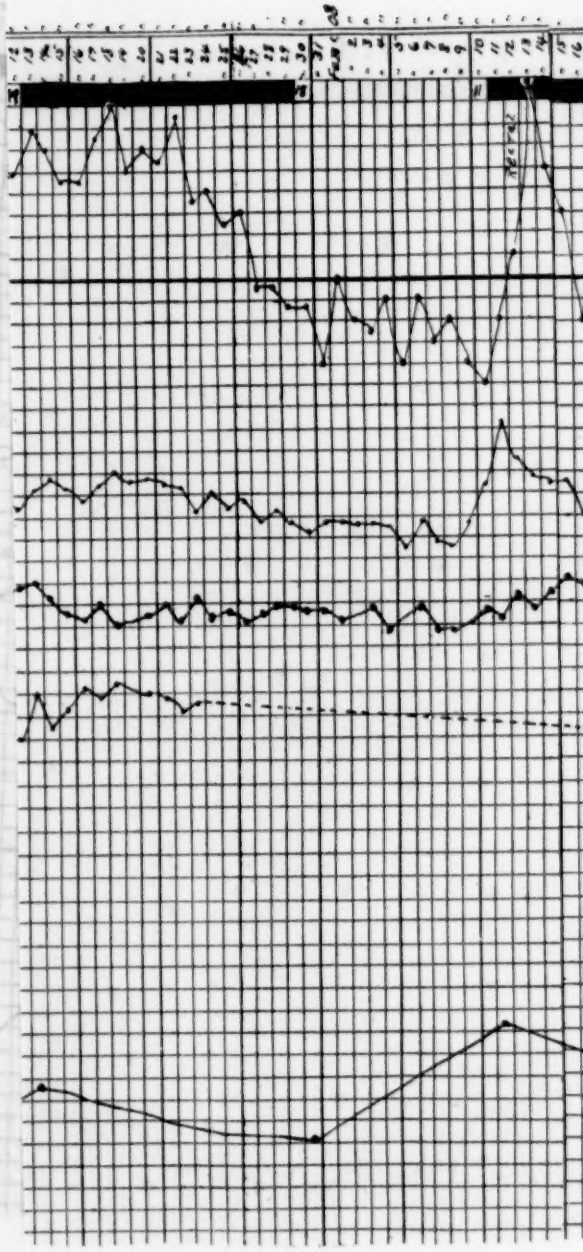

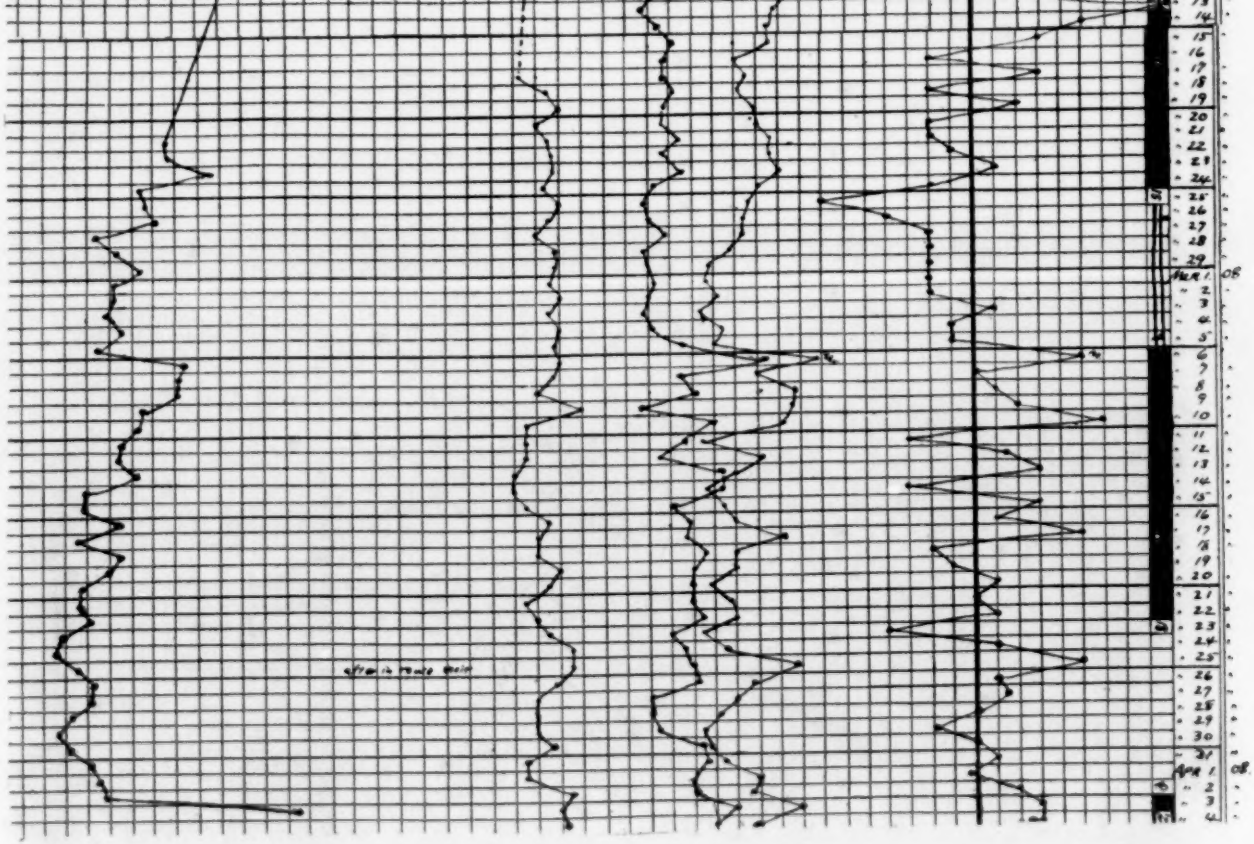
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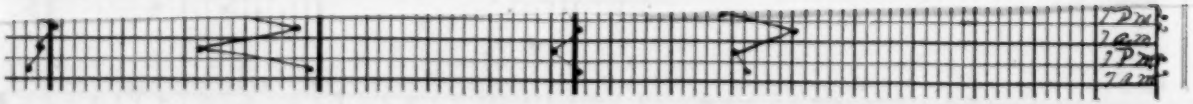
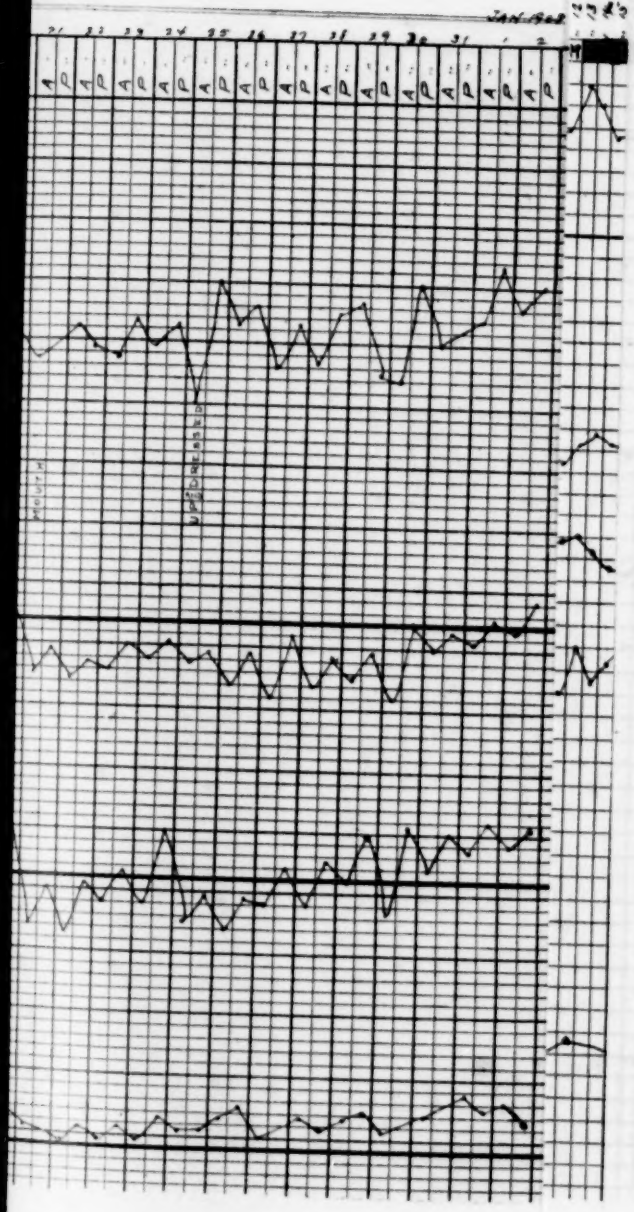
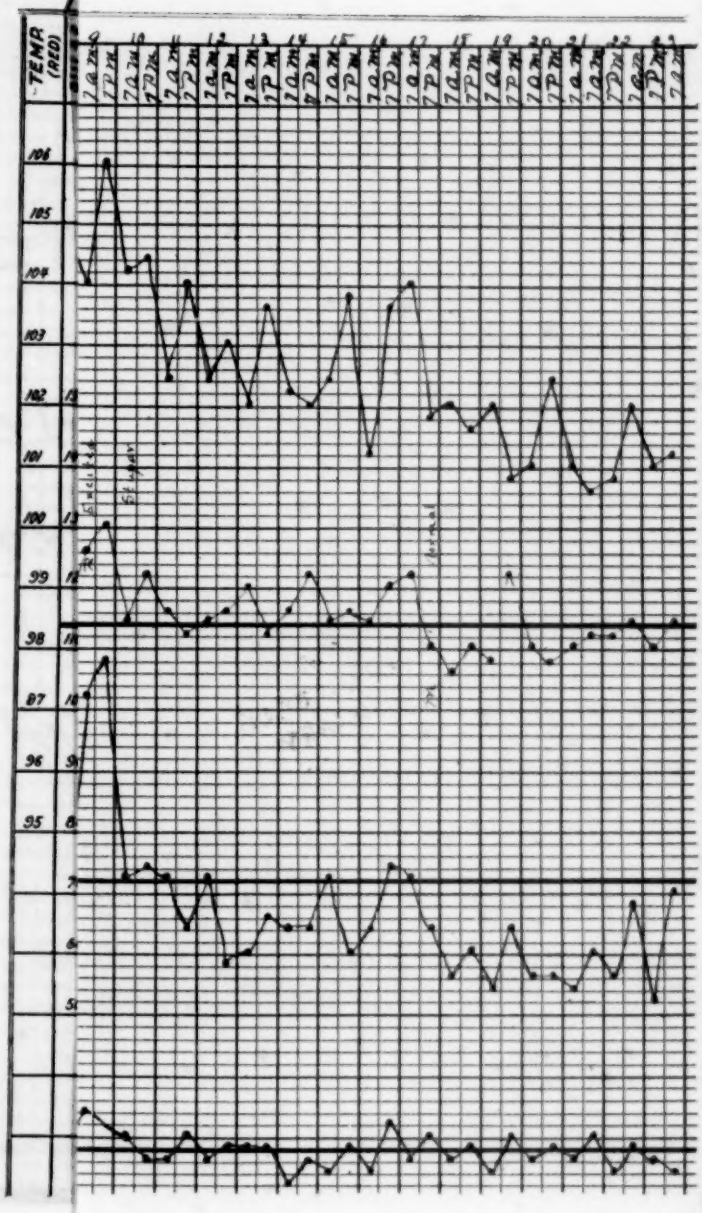
APR 1 08






TEMP (HEAD)
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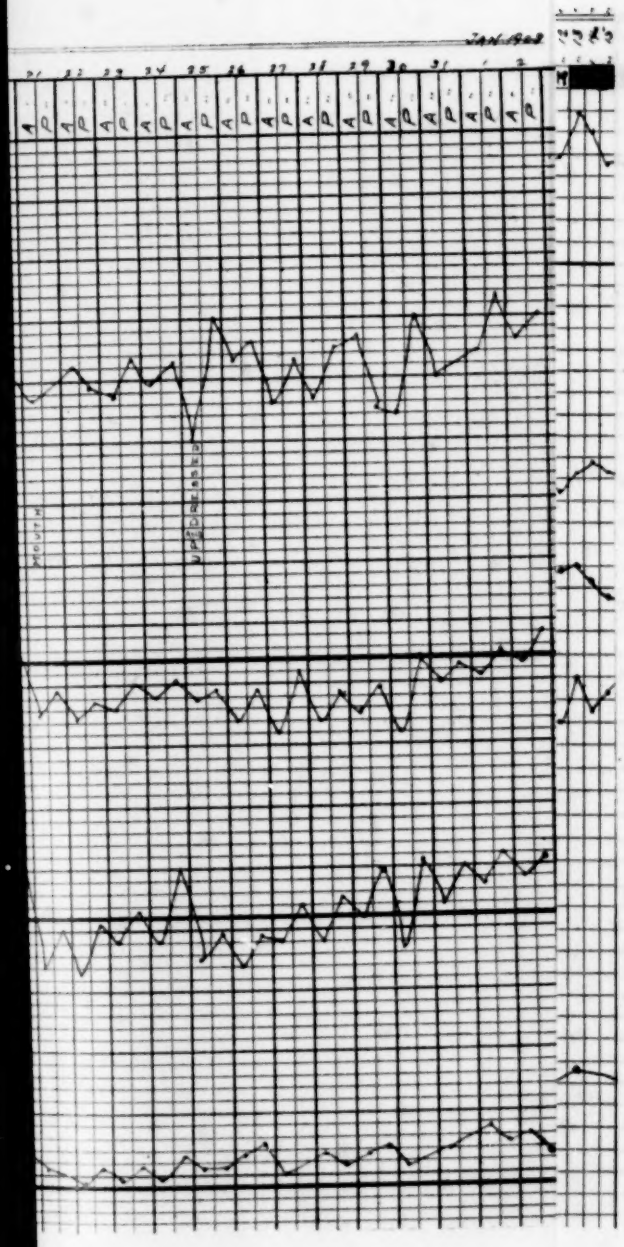

1907 October
November
TEMP (RED)
PULSE (BLACK)
RESP (BLUE)
B.P. (BLACK)
106
105
104
103
102
101
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99
98
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150
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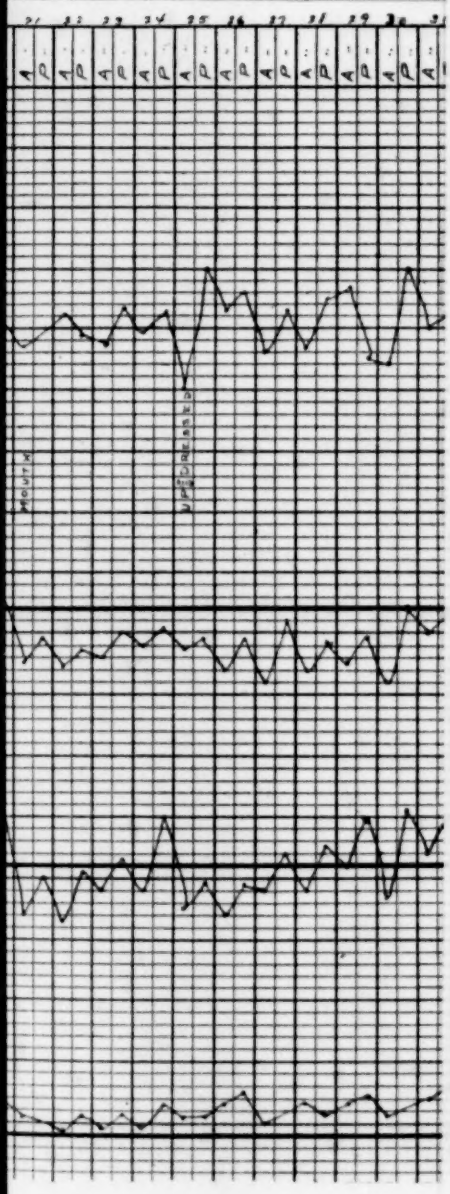
Resp. Rate

CHART 3.



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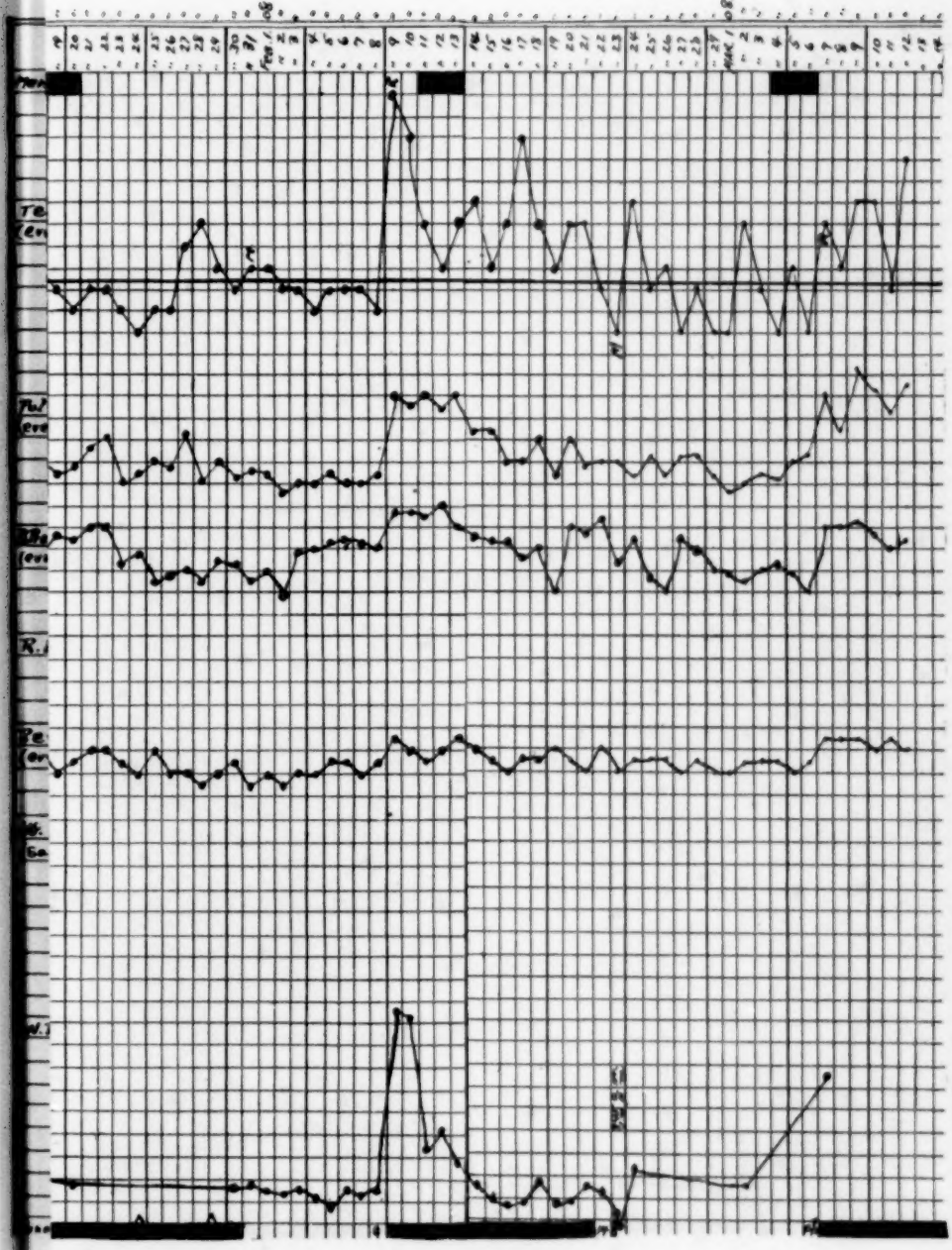

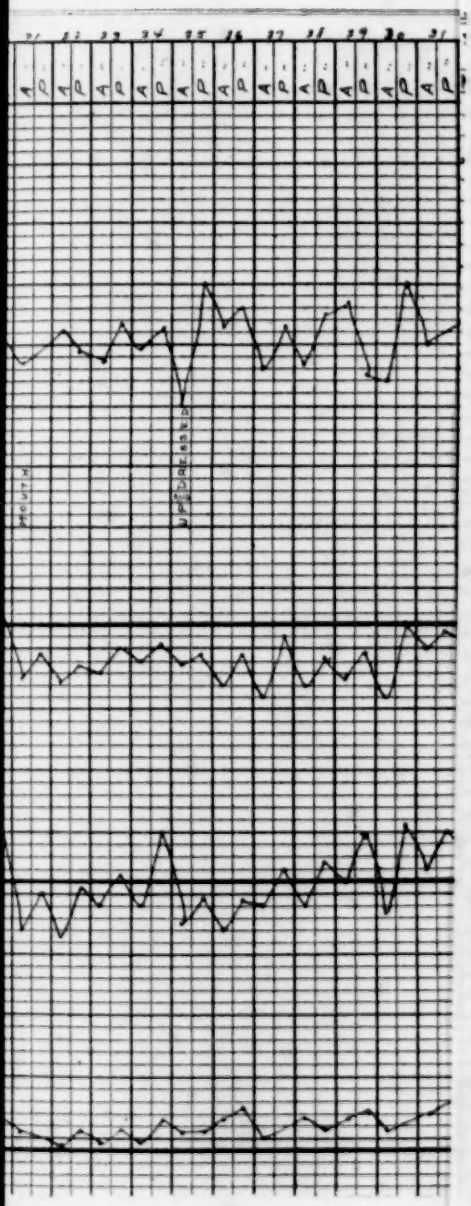

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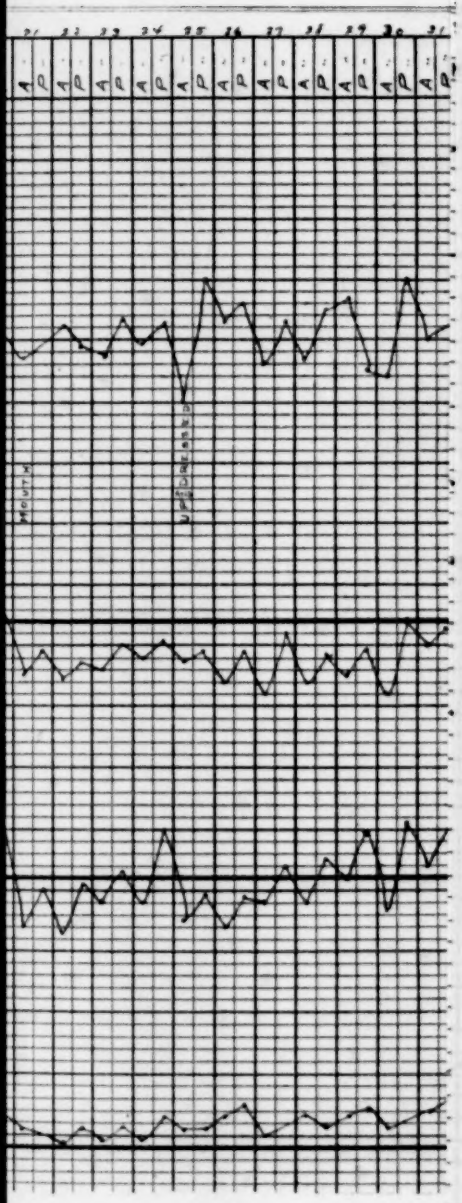
Oct.
Nov.
Dec.
Transverse
Te. Temp. (Evening)
Pulse (Evening)
Respir. (Evening)
R.B.C.
Hgb. % (Sahli)
W.B.C.
Abnormal
Normal temp.
12
36

CHART 4


21 22 23 24 25 26 27 28 29 30 31
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MOUTH
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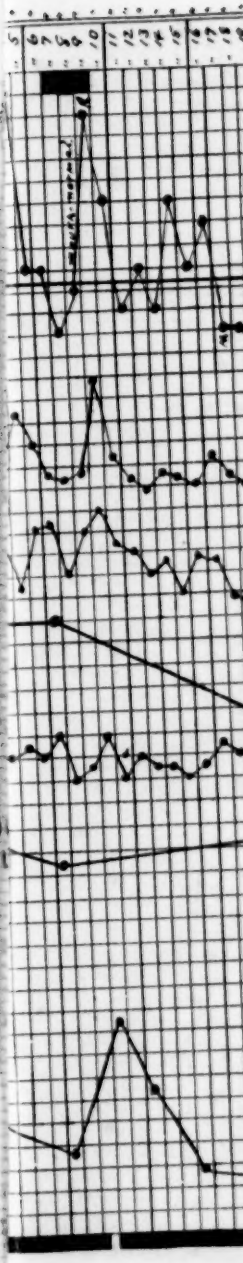
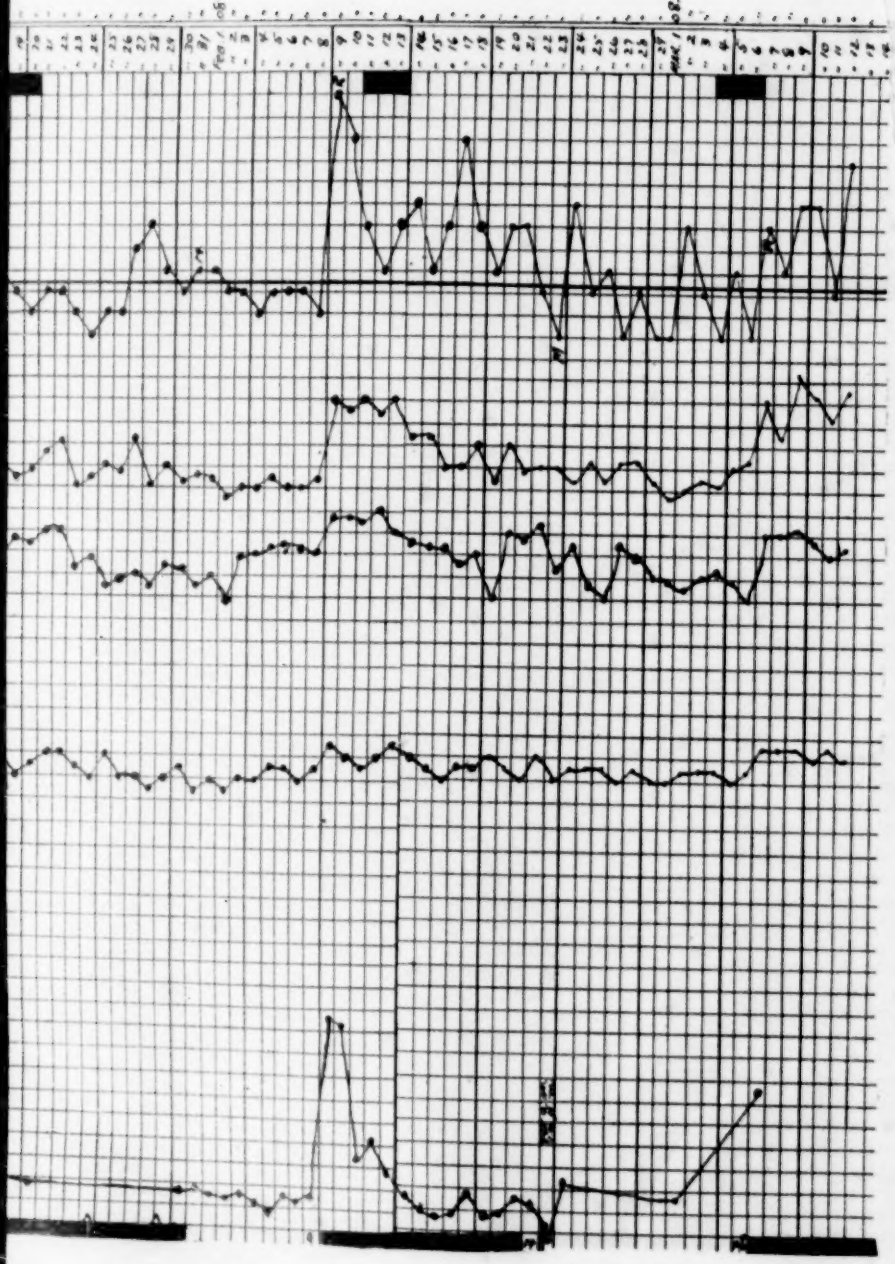

MOUTH-NORMAL

CHART 4



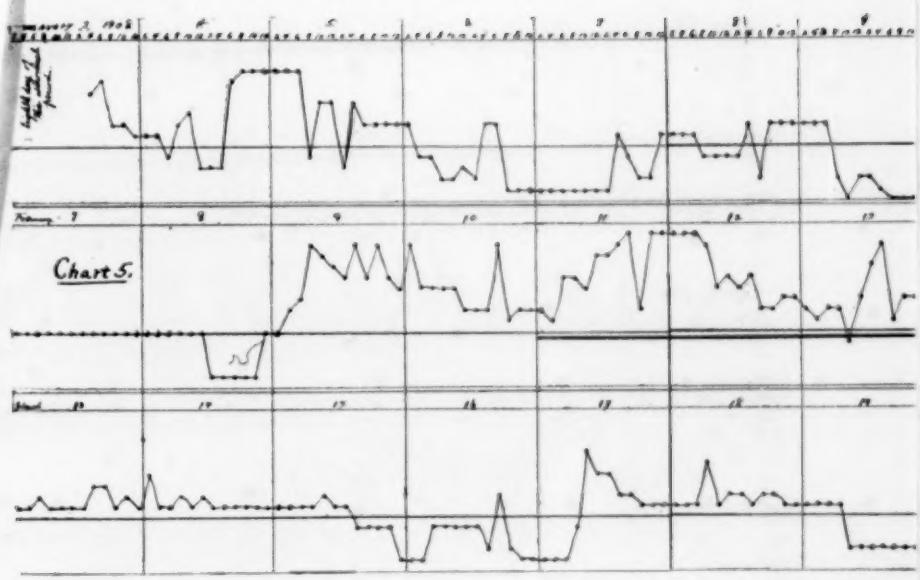
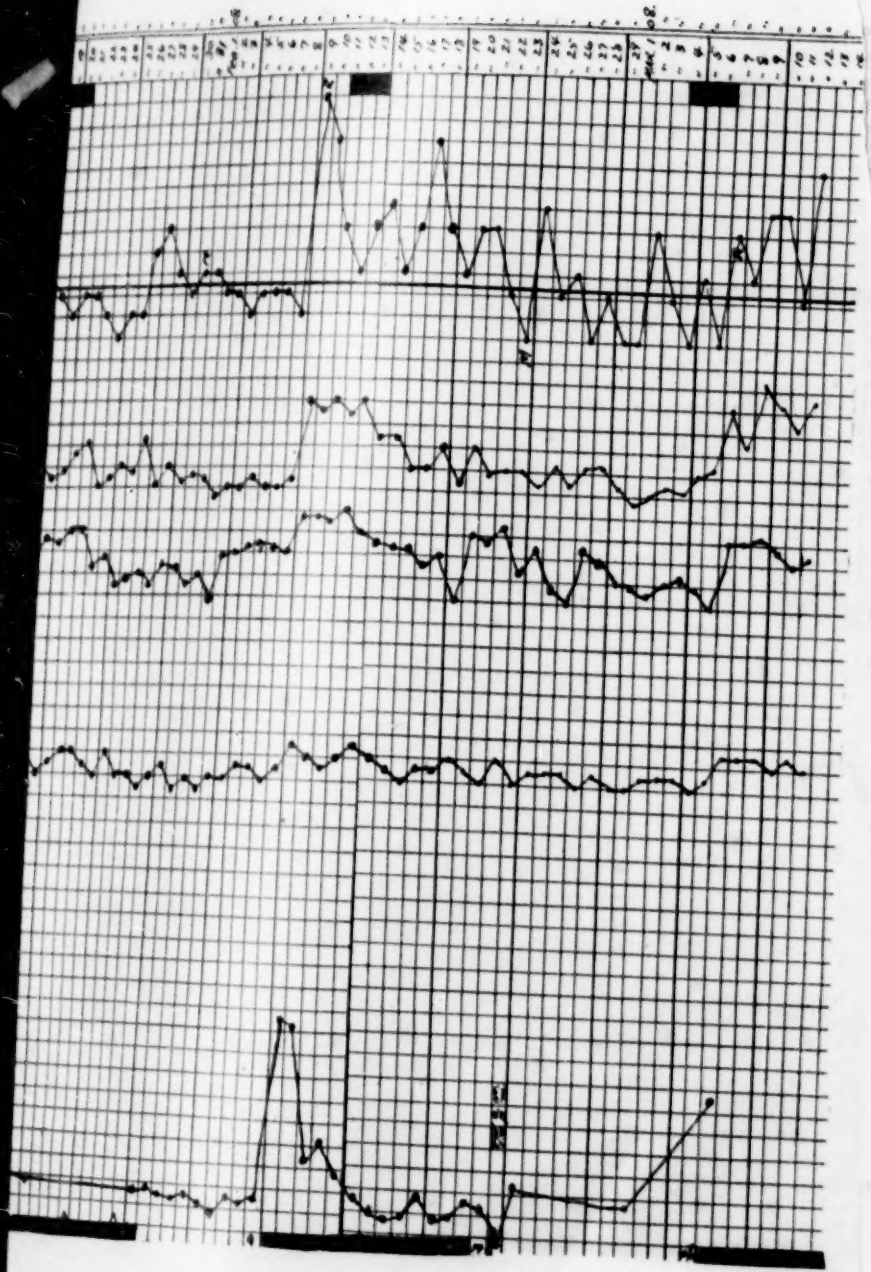
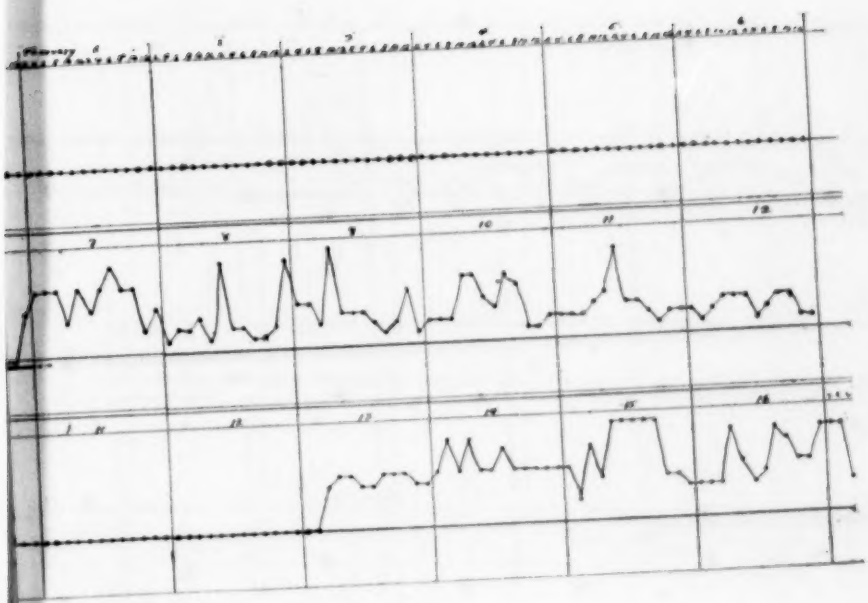
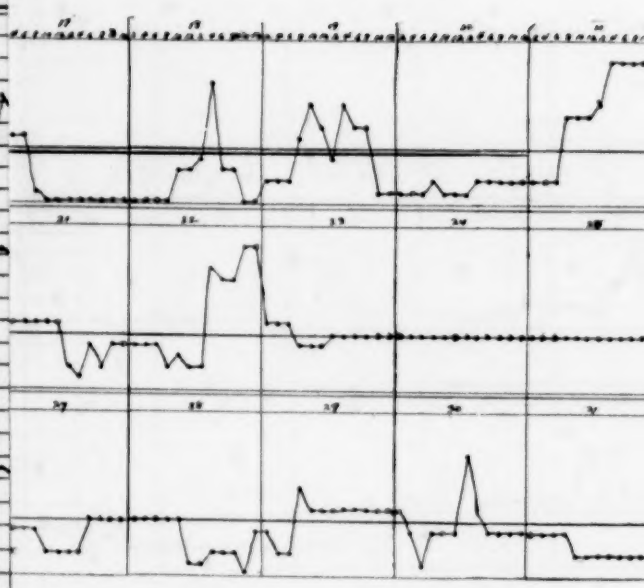


Chart 5.







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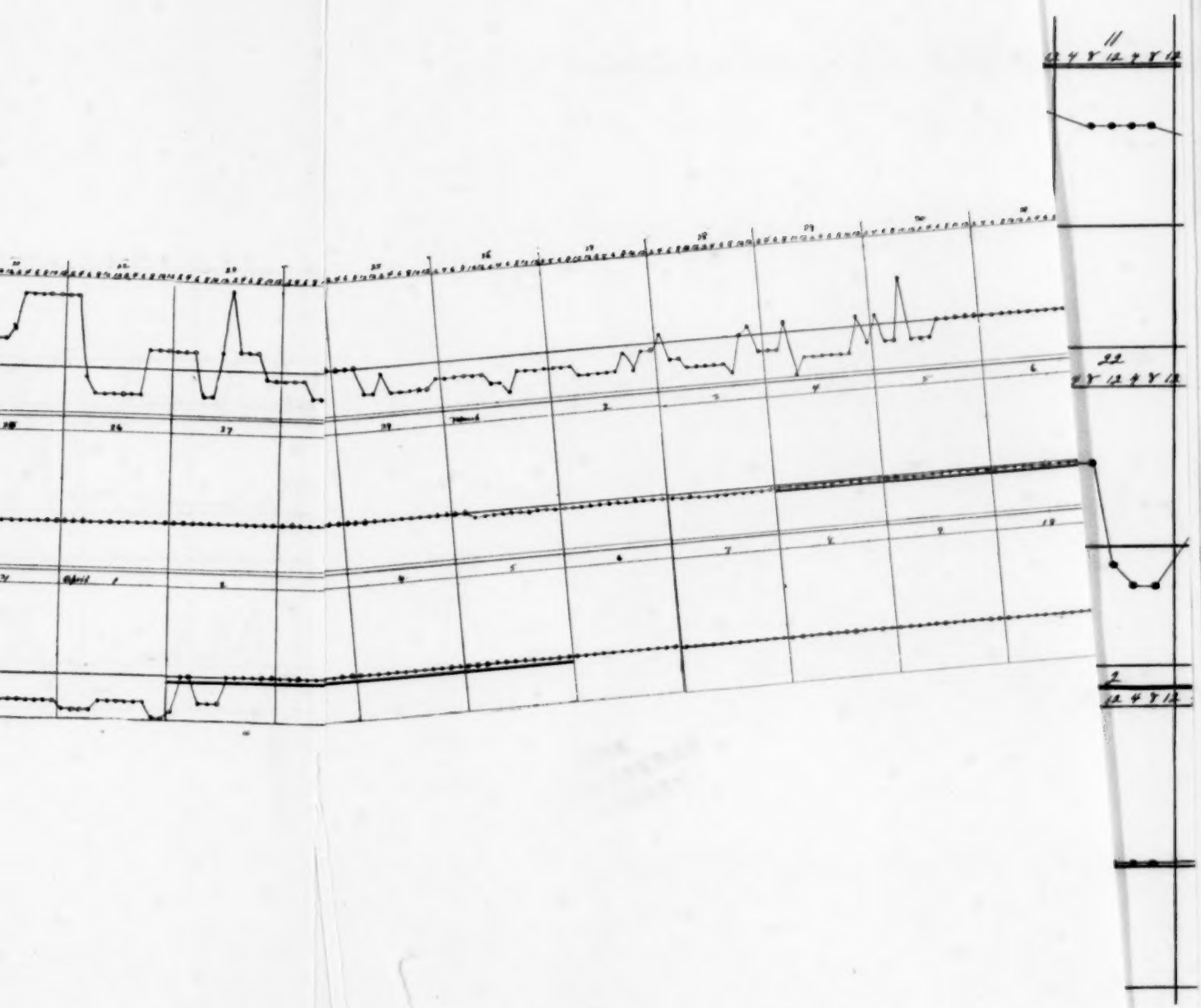

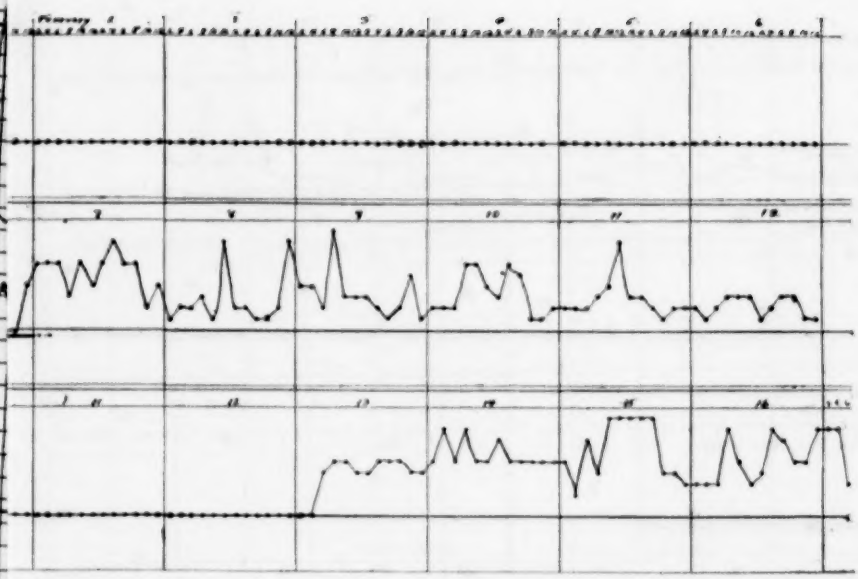

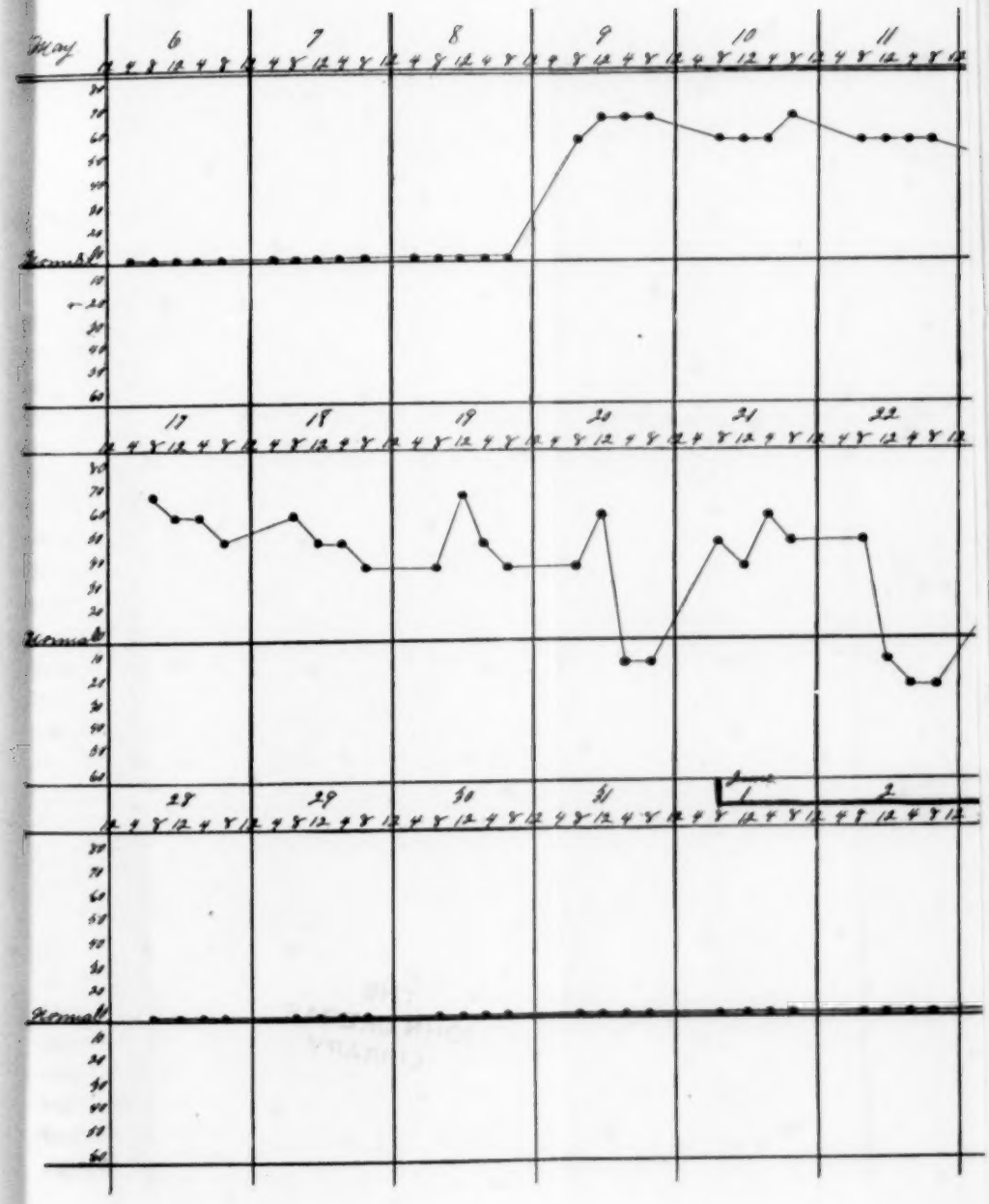
May
6
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Normal
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Normal
June
1
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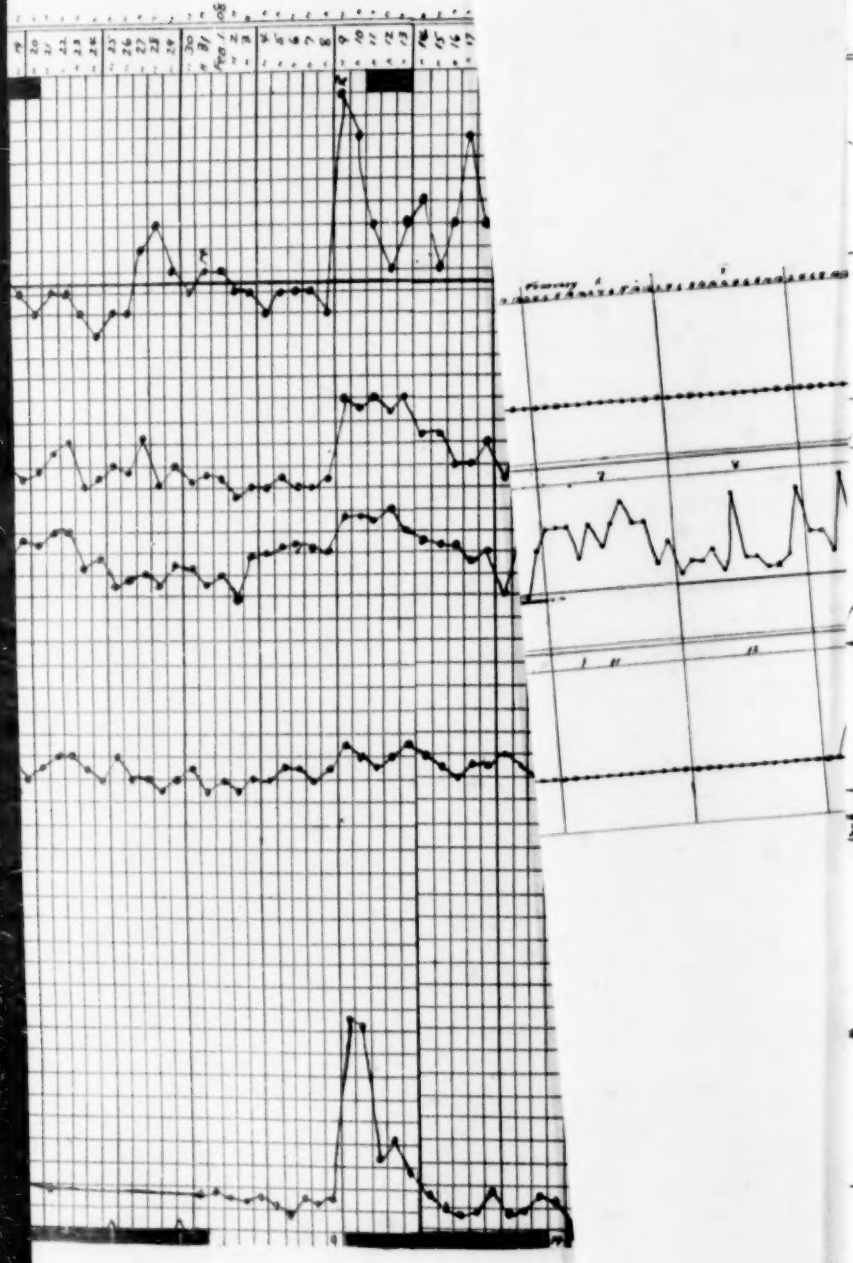
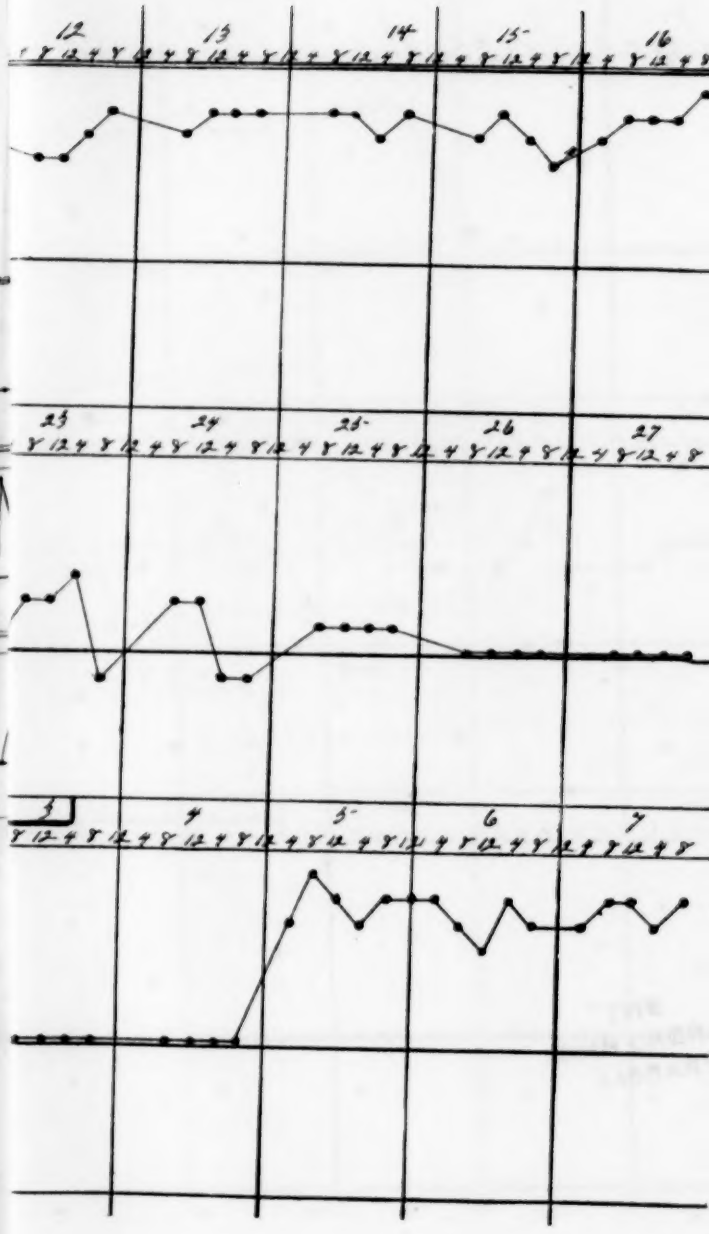
30
31
Normal

CHART 6.

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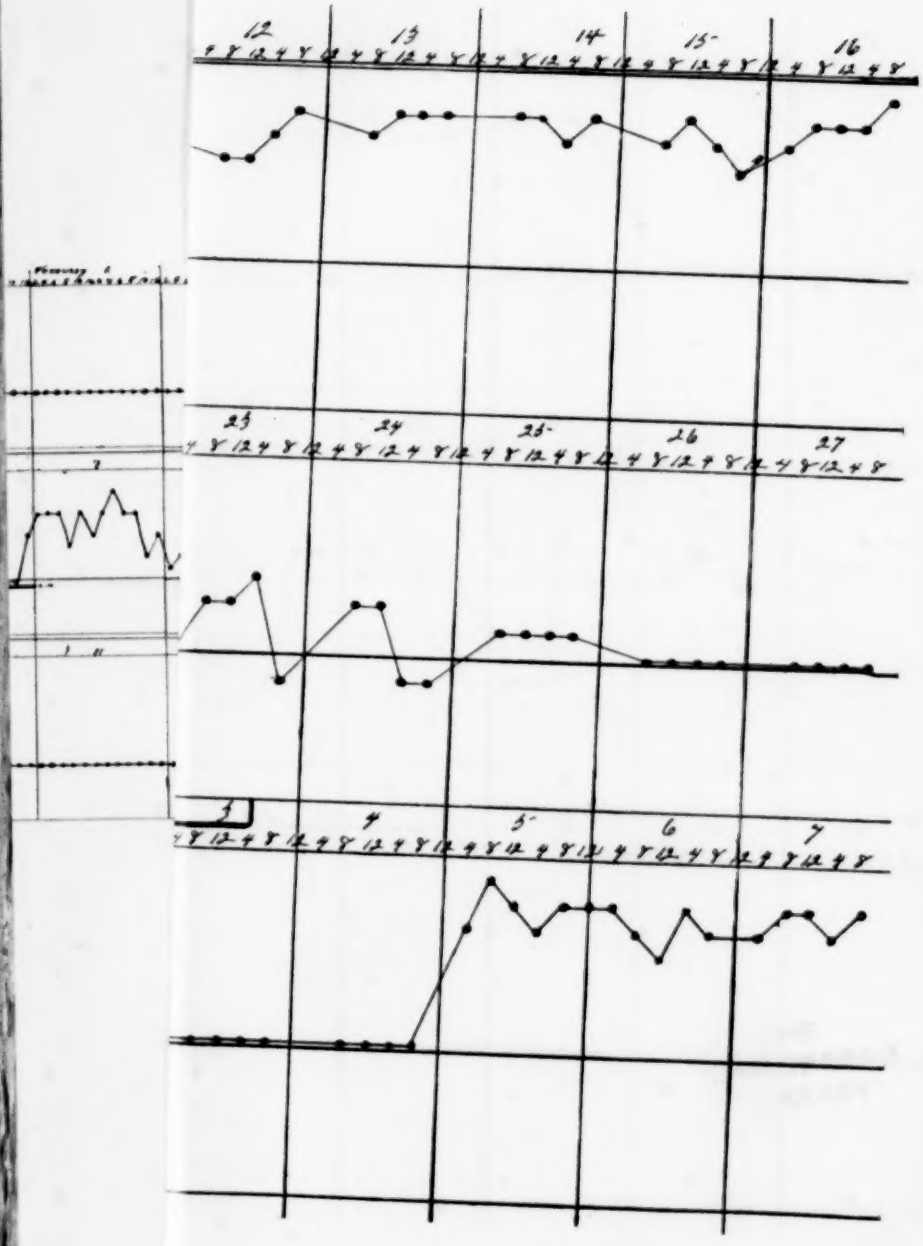
A STUDY OF THE METABOLISM OF TWO ATYPICAL CASES RELATED TO THE DEMENTIA PRECOX GROUP.

By FRANCIS M. BARNES, Jr.,

Assistant Physician and Director of the Clinical Laboratory, The Sheppard and Enoch Pratt Hospital, Towson, Md.

In the preceding paper the clinical condition of these two patients and the results of the examination of the blood have been reported. The details of the case histories and of the blood findings will not, therefore, be repeated here. To sum up briefly: in two individuals during their late twenties a psychosis develops, the onset and subsequent course of which in both cases are similar. The most striking features are the recurring attacks, during which varied grades of excitement and depression alternate. In the woman the excitement is still a most evident symptom, whereas in the man this element has almost entirely disappeared and its place taken by the marked depression (stupor) which in the woman now occurs only towards the end of the excited phase. Deterioration is evident in both patients. In the former paper and here they are considered as "atypical psychoses related to the dementia precox group and particularly to the katatonic variety, in which recurrent attacks, consisting of alternations between phases of varying length of excitement of a maniacal-depressive character, and stupor, persisting throughout a number of years have left the present condition of moderate deterioration noticeable principally in the affective sphere."

The blood examinations which were made on these two patients showed some interesting results but did not bring forth any proof of facts of importance from an etiologic standpoint. The coincidence of the changes in the number of leucocytes and in the temperature and pulse curves during a given phase as shown in the charts of the preceding paper suggested that a study of the metabolic processes during the different stages might afford additional knowledge of value to our understanding of these two cases. The rapidly alternating phases seemed to offer an excellent opportunity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By FRANCIS M. BARNES, Jr.,

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In the preceding paper the clinical condition of these two patients and the results of the examination of the blood have been reported. The details of the case histories and of the blood findings will not, therefore, be repeated here. To sum up briefly: in two individuals during their late twenties a psychosis develops, the onset and subsequent course of which in both cases are similar. The most striking features are the recurring attacks, during which varied grades of excitement and depression alternate. In the woman the excitement is still a most evident symptom, whereas in the man this element has almost entirely disappeared and its place taken by the marked depression (stupor) which in the woman now occurs only towards the end of the excited phase. Deterioration is evident in both patients. In the former paper and here they are considered as " atypical psychoses related to the dementia precox group and particularly to the katatonic variety, in which recurrent attacks, consisting of alternations between phases of varying length of excitement of a maniacal-depressive character, and stupor, persisting throughout a number of years have left the present condition of moderate deterioration noticeable principally in the affective sphere."

The blood examinations which were made on these two patients showed some interesting results but did not bring forth any proof of facts of importance from an etiologic standpoint. The coincidence of the changes in the number of leucocytes and in the temperature and pulse curves during a given phase as shown in the charts of the preceding paper suggested that a study of the metabolic processes during the different stages might afford additional knowledge of value to our understanding of these two cases. The rapidly alternating phases seemed to offer an excellent opportunity

for determining whether or not some variation from the normal of the metabolic processes might be present and bear some relation to the changes in the mental condition. Such variations have been noted to occur. Folin and Shaffer[1] have reported the results of a rather prolonged study of a case in which the phosphate excretion showed fluctuations in amount which paralleled the alternations in the mental state. It is to be regretted, perhaps, that the blood studies already reported could not have been carried out concomitantly with those of metabolism. Even if it had not been that the chemical work was suggested by the blood findings it is doubtful if there would have been sufficient time to carry out the two examinations over the same period. Although considerable time has elapsed between the two series of observations the condition of the patients has not changed materially and it seems that it may be assumed safely that the value of the work has not been vitiated in any way by this time interval and that the findings of several months ago are directly comparable with those made more recently during similar phases.[2]

Plan of the Work and the Methods Used.

The original object of this work was to study under suitable known conditions the metabolism of these two patients. The analytical scheme used by Folin in his studies[3] seemed to be quite satisfactory for the purpose and has been followed with but little change. As the urine work itself in the scheme is quite exacting the feces have not been analyzed. The diet proposed has several features to recommend it but principally because using this diet Folin has gathered together an amount of data concerning metabolism under both abnormal (mental diseases) and normal[4] con-

[1] Folin and Shaffer: The American Journal of Physiology, 1902, VII, p. 135.

[2] During this interval between the blood and chemical work the present clinical laboratory was constructed and equipped and all methods to be used in this study were subjected to repeated controlled and checked experiments. These experiments have occupied the entire time for several months and were concluded only after the writer was satisfied that personal errors had been brought within permissible limits.

[3] Folin: The American Journal of Insanity, 1904, LX, p. 699.

[4] Folin: The American Journal of Physiology, 1905, XIII, p. 45.

ditions, which is available for comparison. The diets used in this work are as follows:

MILK AND EGG DIET.

Milk	500 ccm.
Cream (18-25% fat)	300 "
Eggs	450 gms.
Horlich's Malted Milk	200 "
Sugar	20 "
Sodium chloride	6 "
Water, q. s. a. d.	2,000 ccm.
Water, extra	900 "

STARCH DIET.

Pure arrow root, 400 grams, sodium chloride, 6 grams, partially digested with diastase in 1500 ccm. of water and served with 600 ccm. of cream.

Water, extra..... 900 ccm.

These diets were made in the laboratory. All was given the patient before six o'clock each evening. To ensure as far as possible against all preventable losses and errors reliable special nurses were with these patients constantly during the entire time of the experiment.

The methods which have been used are all well-known and need no detailed description here. The amount of urine was measured in the customary cylinder; the specific gravity determined with an accurate hydrometer at 15 degrees centigrade; the reaction taken with ordinary litmus. Total nitrogen determined by the Kjeldahl method; phosphates by titration with uranium acetate with cochineal as indicator and chlorine estimated according to Volhard. Neutral sulphur, inorganic and ethereal sulphates, urea, ammonia, kreatinin, uric acid, acidity and indican determinations were all made according to the methods which have been devised by Folin.[5] For several months prior to beginning the work on these two patients many experiments were carried out with all methods in

[5] Folin has published a number of papers regarding these methods, of which only those describing the methods as finally adopted will be given here. Those described in the following articles are the ones used in this work. No variations have been introduced.

Sulphur and Sulphates. The Journal of Biological Chemistry, 1906, I, p. 131.

Urea. Zeitschrift für physiologische Chemie, 1902, XXXVI, p. 333.

Ammonia. Ibid. 1902, XXXVII, p. 161.

Kreatinin. Ibid. 1904, XLI, p. 223.

Uric acid. Ibid. 1901, XXXII, p. 552.

Acidity. American Journal of Physiology, 1903, IX, p. 265.

Indican. Ibid. 1905, XIII, p. 53.

order to determine their accuracy and uniformity. Experiments were made with both known standard solutions and with specimens of urine. In some instances as many as a hundred or more estimations have been made with one method. Sometimes a dozen duplicates have been carried through and seldom less than six. Exceedingly uniform results were obtained with each procedure and the accuracy comes well within the limits of technical error. The indican is not determined quantitatively. The urea method will not yield satisfactory results unless very closely watched while boiling with the magnesium chloride.

In the preparation of all solutions the greatest care has been exercised. This is true for those used in all titrations as well as for those used in testing the methods themselves. As in many of the determinations small quantities of urine are used inaccuracy in measurement may occur. To minimize such errors small amounts have been measured from pipettes graduated in 0.05 ccm. and larger ones from burettes graduated in 0.1 ccm. In view of the uniform results obtained by these methods duplicate analyses have been made only when some error seems to have occurred or when the results have differed widely from the similar determination of the preceding day. Such occasions have, of course, occurred and are not indicated in the tables. Where differences have been detected on a second determination either a third estimation is made for verification or the one which is considered the correct one is recorded. In several instances where the undetermined nitrogen has constituted an unusually large percentage of the total, the error is undoubtedly with the urea determination and has been detected too late for repetition. Aside from these errors I think that the figures represent as accurate results as may be expected.

Analytical Results.

In Table I (Case I, No. 541) are given the figures for a period of thirty-four days (only thirty-three are shown here, as on December 27 part of the day's voiding was lost and the remainder not analyzed) divided into four sections according to the diet used. During the first no nourishment or water was taken, during the third the starch diet was employed, while during the second and fourth the milk and egg diet was given. The dietary change to

the last period was somewhat unfortunate as it was made at the time when the patient passed from the stuporous phase to the "normal" and any difference that may have occurred might have been masked. The experiment was discontinued because the patient objected strongly to the restrictions which it made necessary. He could not be persuaded to take the starch diet for a few days when "well," so that a comparison with the results obtained with this diet during the stupor could not be made. The first analyses represent the second day of the starvation period.

The clinical condition of this patient has not differed in general from that described in the foregoing paper. He entered upon one of his "abnormal" phases on the morning of December sixth. At first there was the usual degree of psychic elevation—continuous logorrhea, inaccessibility and irrelevancy. There was the accustomed rise in the curves representing the blood pressure, pulse and temperature, the last having begun to appear two days previously. After a short period of this excitement he subsided into his usual condition of stupor. On the fourteenth the temperature had again reached normal and with the exception of slight daily fluctuations remained there until January second, on which day he was up and dressed though somewhat stupid. The stuporous condition persisted with short periods of talkativeness interrupting until towards the end of the second week (December 20) when he began to indicate his wants by signs and gestures; a week later (December 29) he expressed a desire to get up and dress but by the time permission for this could be obtained he had again assumed his former semi-stuporous state. During the next few days he seemed to become progressively brighter and on January second was dressed and out of doors walking. On the following day, however, it was necessary to urge him to dress and after a morning spent in walking out of doors, playing pool, etc., he again became excited and remained so until evening. Coincident with this brief remission, during which time, however, he was not in his "normal" condition, there occurred similar fluctuations in the clinical curves as are seen during the main attack. Following this remission his condition was one of quite uniform stupor until the afternoon of January sixth when he reached his "normal" state. During the last few days of the experiment he was up and about,

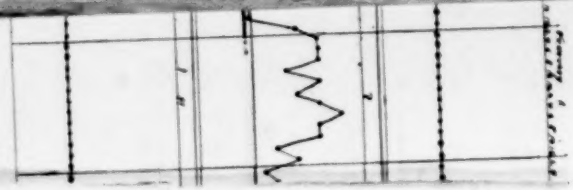


TABLE I.—Case I.—No. 541.

Date.	Vol. in ccm.	Nitrogen in grams.						Ratios. 100 N_2.			Sulphur in grams SO_3				Acidity, ccm. N/10.	Phosphates, Gms. P_2O_5.	Chlorine, Gms. NaCl.	Indican. Fehling's Solution = 100.	Remarks.
		Percentage of total nitrogen.									Percentage of total sulphur.								
Weight in Ks.	Sp. Gr. 15°C. 10.—	Total.	Urea.	Ammonia.	Kreatinin.	Uric Acid.	Rest.	P_2O_5.	SO_3.	Cl.	Total.	Neutral.	Inorganic.	Ethereal.					
Dec. 8. '08	1240	16.28	12.85	0.58	0.88	0.35	1.62	35.12	17.14	61.15	2.81	0.62	2.04	0.15	821.26	5.72	9.96	23.8	2d day.
81.90	30		79.14	3.55	5.39	2.14	9.93					22.0	72.8	5.3					Starvation.
9	860	16.28	13.31	0.74	0.74	0.22	1.29	20.31	18.91	18.4	3.10	0.52	2.45	0.14	701.50	3.33	3.03	27.7	Stuporous, mute, etc.;
79.65	33		81.70	4.53	4.53	1.34	7.90					16.7	79.0	4.5					in bed.
10	660	12.99	10.29	0.77	0.49	0.13	1.31	21.41	18.71	14.9	2.43	0.37	1.94	0.12	733.39	2.78	1.94	2.0	Do. Albumin and casts
77.85	34		79.20	5.92	3.80	1.00	10.00					15.4	80.8	5.0					since onset.
11	560	12.53	9.45	0.90	0.48	0.13	1.80	17.20	19.76	7.4	2.47	0.41	1.97	0.09	723.58	2.15	0.93	0.0	Do.
76.75	35		75.60	7.20	3.84	1.04	12.32					16.4	78.8	3.6					
12	550	12.56	8.96	1.02	0.54	0.18	1.86	14.83	20.38	6.8	2.57	0.40	2.08	0.11	588.16	1.87	0.86	0.0	Do.
76.05	33		72.0	8.20	4.32	1.44	14.04					15.3	80.0	4.2					
13	520	12.07	9.54	0.74	0.53	0.18	1.08	8.77	19.93	5.8	2.43	0.34	2.02	0.08	487.50	1.07	0.71	0.0	Do. Bowels, l.
74.25	34		78.8	6.10	4.38	1.48	9.24					14.1	84.1	3.3					
14	530	11.81	9.13	0.80	0.45	0.17	1.26	12.92	17.6	3.4	2.07	0.29	1.70	0.08	509.90	1.52	0.42	Tr.	Do. 1850 ccm. water.
73.80	34		77.3	6.77	3.80	1.44	10.70					13.8	80.9	3.8					
8–14	707.1	13.50	10.50	0.81	0.58	0.19	1.46	18.65	18.84	16.9	2.56	0.42	2.03	0.11	652.18	2.63	2.55	7.78	Starvation.
Average	33.2		77.67	6.04	4.29	1.41	10.59					17.07	79.48	4.25					1st Period.
15	1060	22.59	19.15	1.21	0.64	0.35	1.24	14.34	15.66	4.5	3.56	0.34	3.05	0.17	701.09	3.26	1.04	62.5	Albumin and casts.
76.05	29		84.7	5.35	2.83	1.54	5.83					9.44	84.7	4.7					1850 ccm. water.
16	1020	21.36	18.44	1.14	0.65	0.30	0.83	18.44	17.18	10.4	3.67	0.26	3.12	0.30	745.00	3.94	2.24	120.0	Albumin and casts.
77.60	31		86.5	5.30	3.04	1.40	3.80					7.1	86.6	8.3					560 ccm. water.
17	950	17.69	14.53	0.94	0.62	0.22	1.38	13.00	17.30	29.8	3.09	0.20	2.58	0.31	761.50	2.50	5.32	120.0	Stupor.
79.65	30		82.1	5.30	3.50	1.20	7.8					6.4	83.2	10.0					
18	1200	17.51	14.26	0.90	0.60	0.20	1.57	15.39	17.04	67.6	2.99	0.27	2.44	0.28	791.36	2.70	11.87	110.0	Do.
80.33	27		81.4	5.10	3.30	1.10	8.9					9.0	81.3	9.3					
19	1340	14.72	12.32	1.00	0.59	0.18	0.63	25.02	18.84	92.9	2.77	0.23	2.31	0.23	902.48	3.68	13.67	130.0	Do. Bowels, l.
81.00	25		83.8	6.8	4.00	1.20	4.2					8.2	82.5	8.2					
20	1160	14.16	11.65	0.73	0.52	0.19	1.07	25.77	19.98	83.5	2.83	0.23	2.33	0.27	741.0	3.65	11.83	160.0	Mute; indicates wants
81.45	26		82.0	5.10	3.70	1.33	7.5					8.13	82.3	9.5					by gestures, etc.
15–20	1121.6	19.09	15.05	0.97	0.60	0.24	1.12	18.66	17.66	46.8	3.15	0.36	2.64	0.26	778.28	3.42	6.46	112.5	Milk and Egg.
[illegible]	28		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					[illegible]	[illegible]	[illegible]					

81.45	26	14.16	82.0	5.10	3.70	1.33	7.5	25.77	19.98	83.5	2.83	8.13	82.3	9.5	741.0	3.65	11.83	160.0	Mute; indicates wants by gestures, etc.
15—20 Average	1121.6 28	12.00	15.06 83.4	0.97 5.49	0.60 3.4	0.24 1.33	1.12 6.20	18.06	17.56	42.8	2.15	0.26 8.23	2.64 83.41	0.26	[illegible]	[illegible]	[illegible]	[illegible]	Milk and Egg. [illegible]
21 81.45	1260 18	7.97	6.17 77.10	0.49 6.10	0.52 6.50	0.13 1.62	0.66 8.25	33.0	11.63	116.5	0.93	0.18 19.3	0.57 61.2	0.18 19.3	555.06	2.64	9.32	71.4	Stupor.
22 81.45	1820 13	5.23	3.59 69.03	0.45 8.72	0.53 10.19	0.13 2.48	0.53 10.1	39.18	12.99	201.7	0.68	0.18 26.4	0.35 51.4	0.15 22.0	462.28	1.91	10.56	55.5	Short period of logorrhea last night.
23 80.78	1880 11	3.85	2.44 63.30	0.34 8.83	0.51 13.24	0.10 2.63	0.46 11.9	37.81	14.50	232.8	0.56	0.16 28.5	0.28 50.0	0.12 21.4	373.07	1.46	8.99	45.4	Stupor.
24 81.23	1600 11	3.19	2.01 63.00	0.32 10.03	0.47 14.73	0.07 2.31	0.32 10.03	48.2	16.59	140.2	0.53	0.14 26.4	0.28 53.2	0.11 20.9	355.84	1.54	4.48	25.0	Do.
25 81.00	1785 12	3.81	2.17 56.95	0.37 9.71	0.61 16.01	0.08 2.17	0.58 15.2	42.34	19.83	244.0	0.75	0.23 30.5	0.37 48.9	0.15 20.4	396.98	1.61	9.28	29.4	Mute:answers questions by nodding head, etc.
26 81.68	2020 11	3.14	1.90 60.38	0.33 10.41	0.54 17.03	0.06 1.90	0.32 10.1	40.07	20.70	372.7	0.65	0.23 35.5	0.29 45.2	0.13 19.38	328.86	1.26	11.72	25.0	Mute. Bowels, 1.
28 80.78	1555 11	2.60	1.23 47.40	0.43 16.6	0.49 19.00	0.06 2.42	0.37 14.1	47.23	22.66	208.4	0.59	0.25 42.37	0.25 42.37	0.09 15.25	320.95	1.23	5.29	14.2	Brighter. Bowels, 1.
29 80.89	2160 11	2.62	1.24 47.30	0.34 12.8	0.50 19.00	0.05 2.07	0.49 18.8	47.63	22.63	329.2	0.59	0.27 45.44	0.23 38.7	0.09 15.99	291.17	1.25	8.64	23.8	Talking in a. m. Bowels, 1.
30 81.00	1820 11	2.88	1.53 53.10	0.32 11.25	0.53 18.30	0.08 2.77	0.42 14.5	37.82	21.62	366.4	0.62	0.27 43.01	0.25 40.29	0.10 16.69	259.90	1.09	10.56	25.0	Talking at random in a. m. Bowels, 1.
31 79.88	2370 10	3.75	1.95 52.0	0.46 12.2	0.61 16.20	0.10 2.74	0.63 16.8	31.65	20.81	334.7	0.78	0.36 46.06	0.33 41.7	0.09 12.19	263.54	1.19	12.56	12.5	Do.
Jan. 1, '09 79.76	2340 11	3.45	2.07 60.0	0.33 9.56	0.61 17.68	0.09 2.69	0.35 10.14	37.09	20.46	243.4	0.71	0.33 46.73	0.30 41.77	0.08 11.47	306.07	1.28	8.40	21.7	Do.
2 79.65	1240 10	2.30	1.31 56.5	0.25 10.80	0.45 19.39	0.05 2.09	0.25 10.86	22.13	23.35	129.3	0.54	0.27 50.4	0.21 38.54	0.06 10.75	182.03	0.51	2.98	9.0	Out of doors; stupid. Bowels, 1.
3 80.10	1760 13	3.61	1.84 50.9	0.47 13.00	0.71 19.66	0.12 3.33	0.47 13.05	36.29	24.99	311.9	0.90	0.44 48.2	0.40 43.77	0.07 7.98	363.26	1.31	11.26	5.0	Became excited about noon.
21—3 Average	1840.2 11.5	3.65	2.27 57.22	0.38 10.33	0.54 16.30	0.08 2.48	0.45 12.5	36.40	20.0	246.4	.688	0.28 40.06	0.31 44.96	0.10 14.90	338.39	1.32	8.75	24.2	Starch. 3d Period.
4 80.33	1660 17	5.42	3.88 71.5	0.33 6.01	0.50 9.1	0.14 2.50	0.58 10.70	32.38	23.18	138.6	1.26	0.31 24.58	0.84 66.61	0.11 8.72	243.69	1.76	13.28	120.0	Talking in a. m.; mute in p. m.
5 79.88	1990 18	9.59	7.30 76.06	0.45 4.65	0.52 5.4	0.12 1.20	1.20 12.50	26.52	26.73	161.4	2.57	0.50 19.45	1.85 71.97	0.22 8.56	401.98	2.55	15.52	205.0	Do. Bowels, 1.
6 80.55	1100 22	9.68	7.18 74.10	0.42 4.30	0.49 5.03	0.10 1.06	1.49 15.30	30.28	24.91	61.18	2.42	0.41 16.96	1.88 77.64	0.13 5.37	528.00	2.94	5.94	110.0	"Normal" in p. m. Bowels, 2.
7 80.78	900 27	10.71	8.84 82.5	0.39 3.64	0.49 4.50	0.10 1.00	0.88 8.20	25.11	24.55	61.94	2.64	0 29 10.96	2.14 80.89	0.21 7.94	546.48	2.70	6.66	55.5	"Normal"; out of doors.
8 81.56	1610 18	11.73	9.47 80.7	0.45 3.80	0.51 4.40	0.11 0.93	1.19 10.10	29.24	20.74	104.0	2.44	0.31 12.68	1.98 80.98	0.15 6.14	682.84	3.44	12.24	71.4	Do.
9 81.34	1340 27	10.39	8.50 81.8	0.42 4.04	0.51 4.90	0.12 1.15	0.84 8.08	32.06	22.94	119.6	2.39	0.24 10.03	1.97 82.35	0.18 7.52	664.64	3.34	13.40	62.5	Do.
4—9 Average	1433.3 215	9.58	7.52 77.77	0.41 4.41	0 50 5.55	0.12 1.31	1.03 10.31	29.26	23.84	107.8	2.28	0.34 15.77	1.77 76.74	0.17 7.37	511.27	2.78	11.17	104.1	Milk and Egg. 4th Period.

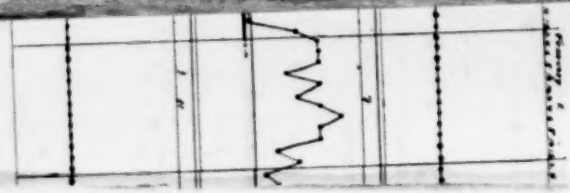


TABLE I.—Case I.—No. 541.

Date.	Vol. in ccm.	Nitrogen in grams.						Ratios. 100 N_2.			Sulphur in grams SO_3				Acidity, ccm. N/10.	Phosphates, Gms. P_2O_5.	Chlorine, Gms. NaCl.	Indican, Fehling's Solution = 100.	Remarks.
		Percentage of total nitrogen.									Percentage of total sulphur.								
Weight in Ks.	Sp. Gr. 15°C. 10.—	Total.	Urea.	Ammonia.	Kreatinin.	Uric Acid.	Rest.	P_2O_5.	SO_3.	Cl_2.	Total.	Neutral.	Inorganic.	Ethereal.					
Dec. 8 '08	1240	16.28	12.85	0.58	0.88	0.35	1.62	35.12	17.14	61.15	2.81	0.62	2.04	0.15	821.26	5.72	9.96	23.8	2d day.
81.90	30		79.14	3.55	5.39	2.14	9.96					22.0	72.8	5.3					Starvation.
9	860	16.28	13.31	0.74	0.74	0.22	1.29	20.31	18.91	18.4	3.10	0.52	2.45	0.14	701.50	3.33	3.03	27.7	Stuporous, mute, etc.; in bed.
79.05	33		81.70	4.53	4.53	1.34	7.90					16.7	79.0	4.5					
10	660	12.99	10.29	0.77	0.49	0.13	1.31	21.41	18.71	14.9	2.43	0.37	1.94	0.12	733.39	2.78	1.94	2.0	Do. Albumin and casts
77.85	34		79.20	5.92	3.80	1.00	10.00					15.4	80.8	5.0					since onset.
11	590	12.53	9.45	0.90	0.48	0.13	1.80	17.20	19.76	7.4	2.47	0.41	1.97	0.09	723.58	2.15	0.93	0.0	Do.
76.75	35		75.60	7.20	3.84	1.04	12.32					16.4	78.8	3.6					
12	550	12.56	8.96	1.02	0.54	0.18	1.86	14.83	20.38	6.8	2.57	0.40	2.08	0.11	588.16	1.87	0.86	0.0	Do.
76.05	33		72.0	8.20	4.32	1.44	14.04					15.3	80.0	4.2					
13	520	12.07	9.54	0.74	0.53	0.18	1.08	8.77	19.96	5.8	2.43	0.34	2.02	0.08	487.50	1.07	0.71	0.0	Do. Bowels, 1.
74.25	34		78.8	6.10	4.38	1.48	9.24					14.1	84.1	3.3					
14	530	11.81	9.13	0.80	0.45	0.17	1.26	12.92	17.6	3.4	2.07	0.29	1.70	0.08	509.90	1.52	0.42	Tr.	Do. 1850 ccm. water.
73.80	34		77.3	6.77	3.80	1.44	10.70					13.8	80.9	3.8					
8–14	707.1	13.50	10.50	0.81	0.58	0.19	1.46	18.65	18.84	16.9	2.56	0.42	2.03	0.11	652.18	2.63	2.55	7.78	Starvation.
Average	33.2		77.67	6.04	4.29	1.41	10.59					17 67	79.48	4.25					1st Period.
15	1060	22.59	19.15	1.21	0.64	0.35	1.24	14.34	15.66	4.5	3.56	0.34	3.05	0.17	701.09	3.26	1.04	62.5	Albumin and casts.
76.05	29		84.7	5.35	2.83	1.54	5.83					9.44	84.7	4.7					1850 ccm. water.
16	1020	21.36	18.44	1.14	0.65	0.30	0.83	18.44	17.18	10.4	3.67	0.26	3.12	0.30	745.00	3.94	2.24	120.0	Albumin and casts.
77.60	31		86.5	5.30	3.04	1.40	3.80					7.1	86.6	8.3					560 ccm. water.
17	950	17.69	14.53	0.94	0.62	0.22	1.38	13.00	17.30	29.8	3.09	0.20	2.58	0.31	761.50	2.50	5.32	120.0	Stupor.
79.65	30		82.1	5.30	3.50	1.20	7.8					6.4	83.2	10.0					
18	1200	17.51	14.26	0.90	0.60	0.20	1.57	15.39	17.04	67.6	2.99	0.27	2.44	0.28	791.36	2.70	11.87	110.0	Do.
80.33	27		81.4	5.10	3.30	1.10	8.9					9.0	81.3	9.3					
19	1340	14.72	12.32	1.00	0.59	0.18	0.63	25.02	18.84	92.9	2.77	0.23	2.31	0.23	902.48	3.68	13.67	130.0	Do. Bowels, 1.
81.00	25		83.8	6.8	4.00	1.20	4.2					8.2	82.5	8.2					
20	1160	14.16	11.65	0.73	0.52	0.19	1.07	25.77	19.98	83.5	2.83	0.23	2.33	0.27	741.0	3.65	11.83	160.0	Mute; indicates wants
81.45	26		82.0	5.10	3.70	1.33	7.5					8.13	82.3	9.5					by gestures, etc.
15–20	1121.6	18.00	15.05	0.97	0.60	0.24	1.12	19.66	17.66	48.6	2.15	0.26	2.61	0.26	779.53	3.02	7.42	122.1	Milk and Egg.
Average	28		83.4	5.42	3.3	1.33	6.22					8.24	82.74	8.24					

965

15—20 Average	1121.6 28	18.00	15.05 83.4	0.97 5.19	0.60 3.1	0.24 1.30	1.12 6.39	18.66	17.26	42.5	2.15	0.26 6.06	2.64 45.43	0.26 5.51	323.73	3.65	7.66	100.1	Milk and Egg.
21 81.45	1260 18	7.97	6.17 77.10	0.49 6.10	0.52 6.50	0.13 1.62	0.66 8.25	33.0	11.63	116.5	0.93	0.18 19.3	0.57 61.2	0.18 19.3	555.06	2.64	9.32	71.4	Stupor.
22 81.45	1820 13	5.23	3.59 69.03	0.45 8.72	0.53 10.19	0.13 2.48	0.53 10.1	39.18	12.99	201.7	0.68	0.18 26.4	0.35 51.4	0.15 22.0	462.28	1.91	10.56	55.5	Short period of logorrhea last night.
23 80.78	1880 11	3.85	2.44 63.30	0.34 8.83	0.51 13.24	0.10 2.63	0.46 11.9	37.81	14.50	232.8	0.56	0.16 28.5	0.28 50.0	0.12 21.4	373.07	1.46	8.99	45.4	Stupor.
24 81.23	1600 11	3.19	2.01 63.00	0.32 10.03	0.47 14.73	0.07 2.31	0.32 10.03	48.2	16.59	140.2	0.53	0.14 26.4	0.28 53.2	0.11 20.9	355.84	1.54	4.48	25.0	Do.
25 81.00	1785 12	3.81	2.17 56.95	0.37 9.71	0.61 16.01	0.08 2.17	0.58 15.2	42.34	19.83	244.0	0.75	0.23 30.5	0.37 48.9	0.15 20.4	396.98	1.61	9.28	29.4	Mute; answers questions by nodding head, etc.
26 81.68	2020 11	3.14	1.90 60.38	0.33 10.41	0.54 17.08	0.06 1.90	0.32 10.1	40.07	20.70	372.7	0.65	0.23 35.5	0.29 45.2	0.13 19.38	328.86	1.26	11.72	25.0	Mute. Bowels, 1.
28 80.78	1555 11	2.60	1.23 47.40	0.43 16.6	0.49 19.00	0.06 2.42	0.37 14.1	47.23	22.66	208.4	0.59	0.25 42.37	0.25 42.37	0.09 15.25	320.95	1.23	5.29	14.2	Brighter. Bowels, 1.
29 80.89	2160 11	2.62	1.24 47.30	0.34 12.8	0.50 19.00	0.05 2.07	0.49 18.8	47.63	22.63	329.2	0.59	0.27 45.44	0.23 38.7	0.09 15.99	291.17	1.25	8.64	23.8	Talking in a. m. Bowels, 1.
30 81.00	1820 11	2.88	1.53 53.10	0.32 11.25	0.53 18.30	0.08 2.77	0.42 14.5	37.82	21.62	366.4	0.62	0.27 43.01	0.25 40.29	0.10 16.69	259.90	1.09	10.56	25.0	Talking at random in a. m. Bowels, 1.
31 79.88	2370 10	3.75	1.95 52.0	0.46 12.2	0.61 16.20	0.10 2.74	0.63 16.8	31.65	20.81	334.7	0.78	0.36 46.06	0.33 41.7	0.09 12.19	263.54	1.19	12.56	12.5	Do.
Jan. 1, '09 79.76	2340 11	3.45	2.07 60.0	0.33 9.56	0.61 17.68	0.09 2.69	0.35 10.14	37.09	20.46	243.4	0.71	0.33 46.73	0.30 41.77	0.08 11.47	306.07	1.28	8.40	21.7	Do.
2 79.65	1240 10	2.30	1.31 56.5	0.25 10.80	0.45 19.39	0.05 2.09	0.25 10.86	22.13	23.35	129.3	0.54	0.27 50.4	0.21 38.54	0.06 10.75	182.03	0.51	2.98	9.0	Out of doors; stupid. Bowels, 1.
3 80.10	1760 13	3.61	1.84 50.9	0.47 13.00	0.71 19.66	0.12 3.33	0.47 13.05	36.29	24.99	311.9	0.90	0.44 48.2	0.40 43.77	0.07 7.98	363.26	1.31	11.26	5.0	Became excited about noon.
21—3 Average	1840.2 11.5	3.65	3.27 57.22	0.38 10.83	0.54 16.30	0.08 2.48	0.45 12.5	36.40	20.0	246.4	.688	0.28 40.06	0.31 44.96	0.10 14.90	328.39	1.32	8.75	24.2	Starch. 3d Period.
4 80.33	1660 17	5.42	3.88 71.5	0.33 6.01	0.50 9.1	0.14 2.50	0.58 10.70	32.38	23.18	138.6	1.26	0.31 24.58	0.84 66.61	0.11 8.72	243.60	1.76	13.28	120.0	Talking in a. m.; mute in p. m.
5 79.88	1990 18	9.59	7.30 76.06	0.45 4.65	0.52 5.4	0.12 1.20	1.20 12.50	26.52	26.73	161.4	2.57	0.50 19.45	1.85 71.97	0.22 8.56	401.98	2.55	15.52	205.0	Do. Bowels, 1.
6 80.55	1100 22	9.68	7.18 74.10	0.42 4.30	0.49 5.03	0.10 1.06	1.49 15.30	30.28	24.91	61.18	2.42	0.41 16.98	1.88 77.64	0.13 5.37	528.00	2.94	5.94	110.0	"Normal" in p. m. Bowels, 2.
7 80.78	900 27	10.71	8.84 82.5	0.39 3.64	0.49 4.50	0.10 1.00	0.88 8.20	25.11	24.55	61.94	2.64	0 29 10.96	2.14 80.89	0.21 7.94	546.48	2.70	6.66	55.5	"Normal"; out of doors.
8 81.56	1610 18	11.73	9.47 80.7	0.45 3.80	0.51 4.40	0.11 0.93	1.19 10.10	29.24	20.74	104.0	2.44	0.31 12.68	1.98 80.98	0.15 6.14	682.84	3.44	12.24	71.4	Do.
9 81.34	1340 27	10.39	8.50 81.8	0.42 4.04	0.51 4.90	0.12 1.15	0.84 8.08	32.06	22.94	119.6	2.39	0.24 10.03	1.97 82.35	0.18 7.52	664.64	3.34	13.40	62.5	Do.
4—9 Average	1433.3 215	9.58	7.53 77.77	0.41 4.41	0 50 5.55	0.12 1.31	1.03 10.91	29.26	23.84	107.8	2.28	0.34 15.77	1.77 76.74	0.17 7.37	511.27	2.78	11.17	104.1	Milk and Egg. 4th Period.

active most of the day, walking, playing games, reading, etc. During these last few days he complained much of the diet and maintained that he was very hungry. His weight on December sixth was 86.6 kilos and the seventh 83.3. Until the fourteenth of December, when he was allowed to have 1850 ccm. of water, he refused all offers of food and drink. During the starvation period the weight decreased very rapidly from 86.6 to 73.8 kilos. During this period albumin along with many hyalin and finely granular casts was present.* Faint traces of albumin persisted for two days after taking the milk and egg diet. It has not been present excepting at the onset of an attack and that it is not entirely due to the withdrawal of food is shown by the fact that it was present in faint traces on January third, following the brief remission already mentioned. The presence of albumin has never been noted during the " normal " phase.

There is not much in the tables representing the results of the urinary examinations which is not quite obvious without especial reference here, although a few general points may permit of some further comment in this place. In Case I, Table I, during the starvation period there occurred a rapid fall in the weight and a gradual decrease in the amount of urine which became of a higher specific gravity. After the fourth starvation day the nitrogenous fractions maintained fairly constant amounts with the exception of the ammonia which increased somewhat both relatively and absolutely. Also, the undetermined nitrogen increased. The total acidity decreased only after having remained quite high for four days. The total sulphur decreased but little and this almost parallel with the total nitrogen. The percentage amount of neutral sulphur remained rather high, whereas the ethereal sulphates dropped in amount both absolutely and in percentage of the total sulphur. The indican disappeared very rapidly even in the presence of complete constipation from December fifth to thirteenth. Beginning the second period with the nitrogen-rich diet there is

*The albumin was neither removed from the urine before the total nitrogen determinations were made nor was it estimated by an accurate quantitative method (Esbach). This was an oversight which will explain, at least in part, the large percentage of undetermined nitrogen present during these days.

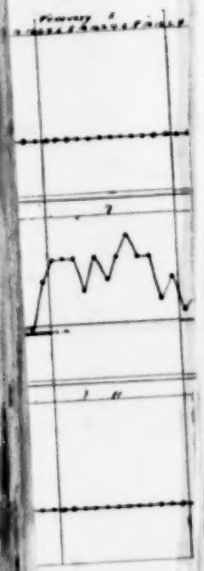
the marked increase in the amounts of the various nitrogenous bodies excreted. There is as marked coincident increase in the amount of urine following the excessive consumption of water at this time. This probable effect of the water on the nitrogenous excretion lasted only for the two days, but served to bring the averages for this period somewhat above the normal.[7] It is noticeable that this effect of the water on the total nitrogen is more marked than it is upon the total sulphur and in consequence of this the $N_2 : SO_3$ ratio is lower on this day than at any other time while on this diet. The indican and chlorine values show the most decided changes in amounts. All of the changes are such as might be expected with such variations in food amounts and if the averages for this period are considered it will be seen that the various urinary constituents very soon reached amounts which are quite normal, with the exception of the indican, which is high.

The third period is interesting in the fact that it shows to what a great extent the distribution of the nitrogenous and sulphur fractions depend upon the total amounts of these two constituents present in the urine. The parallelism between the relative amounts of urea and inorganic sulphates on the one hand and between the kreatinin and neutral sulphur on the other is most striking. The other fractions show to a less extent the effect of this change in the absolute amounts of sulphur and nitrogen excreted. There is nothing unexpected in this behavior of these bodies[8] and this diet was kept up for this length of time only in order to determine to what extent this change would affect the distribution of the component parts of the total nitrogen and sulphur. The indican alone showed results which were not to be looked for, that is, too high for this diet.[9] The results of the fourth period require but a few words.

[7] By "normal" here and in similar instances is meant the figures given as such by Folin in the American Journal of Physiology, 1905, XIII, pp. 62-63.

[8] Folin: American Journal of Physiology, 1905, pp. 45, 66.

[9] That more extensive effects were produced here than by Folin in his experiments is probably due to the fact that 300 ccm. additional cream were supplied with the diet. The very low results recorded on January 2 are about balanced by the high ones of the succeeding day and the apparent discrepancy is probably due to an unequal division of the 48 hours urine into two portions. The patient was continuously watched and the nurse is positive that none could have been lost.



Coincident with the change in his mental condition on the sixth there was discovered no change of moment in the urine. The indican alone shows a decided fall. As there occurred free evacuation of the bowels on January fifth and sixth it would seem that this decrease could very reasonably be explained by the removal of putrefactive material, and, further, that the excessive amount present on the preceding days was due to the accumulation of such material on which bacterial action might be exerted. No definite or constant relation is to be made out between the amount of ethereal sulphates present or the amount of indican as represented by these figures. Constipation seems to regulate within limits the indican formation; what it is that causes the sluggishness of the bowels is not known further than that during this stuporous phase there is a marked depression of body function in general. That an increased production of indol acting in a cumulative manner as a toxic agent may be the cause of the onset of the "attacks" does not seem probable. In the first place at the beginning of these observations the indican is low; secondly, during this attack and just preceding the transition from stupor to "normal" the amount of indican present does not seem to bear any relation to the mental state obtaining.

On looking over this entire series it is found that there is hardly a single feature which might be considered to show definitely an actual abnormality. Perhaps the neutral sulphur is slightly higher than would be expected but this can hardly be called abnormal. The various ratios show wider fluctuations than are conceded to be normal and particularly is this true of the nitrogen-sulphur ratio. It would seem, however, impossible to say just how far these variations were due to the changes in the diet and whether or not they would not entirely disappear in a few more days on a given diet.

With the second patient, the woman, a somewhat different condition was present. Her last "abnormal" period had extended over a somewhat longer time than was usual, about two months, and during this time the amount of nourishment taken was certainly insufficient. In this case the question of a more or less chronic general undernutrition must be kept in mind when considering the results of the urinary analyses. Her weight on Feb-

ruary fifteenth was 44.89 kilos (height 158 cm.), slightly more than half that of Case I (about 80 kilos, height 174 cm.). Further, during the experiment it was impossible to get this patient to take the full amount of special diet desired. Tube feeding was of no avail, as the food was regurgitated. Considering these several points the amount of the milk and egg diet given was only one-half that given to the man in the hope that this amount might be used uniformly throughout the experiment. It was impossible to use the starch diet in this case. During periods 1 and 2 (Table II) about 200 ccm. and during the remainder of the series 800 ccm. of water was given each day. Because of the differences in the diet the absolute amounts of the urinary constituents are not comparable in these two cases. The first analysis recorded represents the urine of the fourth day after beginning the diet. From February twentieth to twenty-fourth inclusive, the patient received the usual ward diet.[10] The last analysis recorded (March fifth) represents but twelve hours excretion, from eight a. m. to eight p. m. on March fourth, the "abnormal" day. The figures on this day for the ammonia, uric acid and undetermined nitrogen are apparently incorrect and could not be re-determined for lack of material.

The clinical condition of the patient during the period of observation requires no especially detailed notice, as it has not differed materially from that described in the preceding paper and the curves of Chart III of that paper would fit very well the particular features existent while this present work was being carried on.

[10] This patient presented so many difficulties in management, requiring the efforts of several nurses to care for her, that continuous observations could not be kept up and it was only attempted to carry out the work at the times of transition from one phase to another together with a sufficient number of days on either side of the changing point to make it possible to detect any variation in metabolism that might occur coincident with the mental deflections. This plan succeeded much better than was hoped and the different periods are indicated in Table II. With the beginning of the excitement on March 4 these difficulties became insurmountable and consequently the experiment was concluded abruptly after having obtained all of the urine secreted until 8 p. m. of that day. During the "abnormal" periods all urine was obtained by repeated catheterizations. The low results recorded on February 17 are explained by an unequal division of the excretion of two consecutive days.

TABLE II.—Case II.—No. 547.

Date.	Vol. in ccm.	Nitrogen in grams.						Ratios. 100 N_2.			Sulphur in grams SO_3.				Acidity, ccm. N/10.	Phosphates, Gms. P_2O_5.	Chlorine, Gms. NaCl.	Indican, Fehling's Solution = 100.	Remarks.
		Percentage of total nitrogen.									Percentage of total sulphur.								
Weight in Ks.	Sp. Gr. 15°C. 10.—	Total.	Urea.	Ammonia.	Kreatinin.	Uric Acid.	Rest.	P_2O_5.	SO_3.	Cl_2.	Total.	Neutral.	Inorganic.	Ethereal.					
Feb. 15, '09 44.89	320 .36	4.06	....	.386 9.51	.230 5.66	.080 1.77	....	37.68	23.96	138.67	0.973	.098 10.07	.779 80.05	.096 9.87	294.4	1.53	5.63	38.4	Stuporous and resistive.
16 45.0	365 .35	4.29	3.40 79.23	.254 5.92	.250 5.83	.079 1.84	.31 7.23	28.21	25.52	135.24	1.095	.101 9.22	.834 76.16	.160 14.61	288.4	1.21	6.66	50.0	Short excited period during night.
17 45.23	265 .36	3.65	2.80 76.69	0.24 6.57	.180 4.93	.037 1.01	.39 10.68	31.77	22.08	114.76	0.806	.077 9.55	.638 79.15	.091 11.29	276.6	1.16	4.19	38.4	Became "normal" 6.30 p. m.
15—17 Average	316.6 .356	4.00	3.10 77.96	.293 7.33	.220 5.47	.079 1.60	.35 8.95	32.55	23.85	136.22	.958	.092 9.61	.750 78.44	.116 11.92	286.5	1.30	5.49	42.3	1st Period. Stupor.
18 45.23	440 .33	5.82	4.73 81.26	.380 6.53	.260 4.47	.073 1.26	.37 6.36	21.30	21.30	117.85	1.24	.110 8.87	.982 78.89	.148 11.90	308.0	1.24	6.86	45.4	In bed. "Normal.
19 45.34	465 .30	5.62	4.32 76.85	.285 5.09	.252 4.48	.065 1.16	.70 12.45	30.60	22.06	95.89	1.24	.120 9.68	1.020 82.25	.100 8.06	353.4	1.72	5.39	22.7	Do.
20 45.56	510 .30	5.83	4.69 80.57	.236 4.05	.240 4.12	.073 1.25	.59 10.13	24.57	21.30	108.58	1.24	.130 10.48	1.010 81.45	.100 8.06	285.6	1.43	6.32	50.0	Do.
18—20 Average	471.6 .31	5.76	4.58 79.56	.300 5.22	.250 4.35	.070 1.22	.55 9.64	25.49	21.55	107.44	1.24	.120 9.67	1.00 84.19	.116 9.34	315.6	1.46	6.19	39.3	2d Period. "Normal."

TABLE II.—Case II.—No. 547.—Continued.

Date.	Vol. in cem.	Nitrogen in grams.						Ratios. 100 N_2.			Sulphur in grams SO_3.				Acidity, cem. N/10.	Phosphates, Gms. P_2O_5.	Chlorine, Gms. NaCl.	Indican, Fehling's Solution = 100.	Remarks.
		Percentage of total nitrogen.									Percentage of total sulphur.								
Weight in Ks.	Sp. Gr. 15°C. 10.—	Total.	Urea.	Ammonia.	Kreatinin.	Uric Acid.	Rest.	P_2O_5.	SO_3.	Cl_2.	Total.	Neutral.	Inorganic.	Ethereal.					
Mch. 1, '09 47.03	1280 .16	7.37	6.20 84.07	.290 3.93	.225 3.05	.078 1.06	.57 7.73	30.10	21.15	76.34	1.56	.082 5.26	1.35 86.54	.130 8.33	409.36	2.22	5.63	50.0	In bed. "Normal."
2 47.36	1000 .16	7.20	6.33 87.86	.297 4.08	.247 3.43	.091 1.26	.24 3.28	25.96	20.40	52.74	1.47	.108 7.35	1.22 82.98	.143 9.73	340.0	1.87	3.80	55.5	Do.
3 47.03	1420 .13	7.20	6.39 88.69	.294 4.08	.230 3.19	.073 1.01	.21 2.97	24.96	19.85	59.18	1.43	.113 7.90	1.25 87.41	.070 4.90	289.68	1.80	4.26	45.4	Do.
1—3 Average	1233.3 .15	7.26	6.31 86.87	.293 4.03	.234 3.22	.081 1.11	.34 4.66	27.01	20.46	62.73	1.48	.101 6.83	1.27 85.64	.114 7.65	346.34	1.96	4.56	50.3	3d Period. "Normal."
4 47.36	940 .19	7.13	6.20 86.92	.284 3.98	.281 3.94	.093 1.30	.27 3.79	22.15	20.61	63.23	1.47	.100 6.80	1.26 85.71	1.07 7.28	289.52	1.58	4.51	55.5	Excited, noisy, resistive. T°. a. m. = 100.2.
5 (12 hrs.) 45.79	320 .28	3.64	3.15 86.53	....	.130 3.57	... .	....	24.48	21.54	87.90	.784	.081 10.33	.664 84.66	.038 4.85	121.60	.891	3.20	9.0	Excited, struggling, screaming, etc.

The various phases during this cycle are indicated in Table II. On comparing Tables I and II one point is striking—no definite abnormalities are to be made out. This statement does not, of course, refer to the evident results of a condition of malnutrition which is pictured in Table II. The principal interest in this case seems to lie in the fact that we have here a condition of undernutrition which affords a good opportunity of studying the metabolism in such a state. The amount of total nitrogen is low at first with a distribution of the various components somewhat similar to that observed when the total nitrogen is reduced by the starch diet as in Case I. This relative decrease in the urea with the attendant percentage increase in the other nitrogenous bodies does not here reach such striking extremes as is the case with the starch diet. With the slow increase in the total nitrogen the percentage distribution of the nitrogenous fractions gradually assumes what might be called a more normal aspect up until the end of the third period ending on March third. The undetermined nitrogen in this case never reached a large amount. The remarks on the nitrogenous bodies apply likewise to the total sulphur and its component parts but not to the same extent. It is to be remembered here that in proportion to the body weight the total amounts of nitrogen and sulphur excreted are not so excessively reduced from the normal and that consequently extensive disturbances of the usual distribution of their components would not be expected. When the ratios shown in Table II are examined it is seen that the P_2O_5, SO_3 and Cl_2 in relation to the total nitrogen are high in amounts at first but gradually decrease as the nitrogen increases. In other words, the nitrogen increases in absolute amount relatively more rapidly than do these three urinary constituents.

With the increase in the various urinary constituents there is noted an increase in the weight. This cannot be attributed to this particular diet alone as it is always noted to occur during the "normal" phases. During the last "abnormal" period which persisted much longer than usual there was a considerable loss in weight which was not made up during this last "well" phase, so that she is still from five to seven or eight kilos below the average for her.

As the patient became excited at three a. m. on March fourth the urine analyzed on that day represents almost entirely that excreted on the last "normal" day of the preceding phase. If any change in metabolic function was to be expected to occur with any reference to the mental changes in this patient it would seem that it might reasonably be looked for here. Some such change as this may have occurred but is not demonstrable with the methods here employed. The only point noticeable, and that a small one, is that the kreatinin on this day was a trifle higher than it had ever been before in this patient. The results of the examination of the subsequent twelve hours' voiding offer no further help. Also, it might be noted that there was a decided loss in weight. So far as the work on this patient is concerned it has not shown that there is present any disturbance of the metabolism which bears any relation to the mental condition excepting the indirect one that during the "abnormal" phase undernutrition is evident. It was impossible to carry this examination further but it is a question whether further observations along this line would afford any facts of value from a psychiatrical standpoint.

From the results of the study of the blood of these two cases it was concluded that the recurring hyperleucocytosis coincident with the changes in the mental state might be due to some form of intoxication which might find further expression in some discoverable disturbance of metabolism and it was thought that this present study might demonstrate the nature and extent of such metabolic disorder should it be present. The scheme of examination adopted for bringing about the solution of this problem has not been successful in accomplishing the desired object. This, however, does not mean necessarily that some such intoxication is not present until it is known that the methods here employed to detect it are efficient. Further work alone can clear up this point.

THE QUESTION OF AUTOINTOXICATION IN ACUTE DEPRESSIVE PSYCHOSES.*

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This investigation was suggested by Prof. Christian A. Herter with the idea that a more detailed study than had hitherto been made might yield some definite data.

The conditions under which an autointoxication might be regarded as the etiological factor in such types of insanity as the acute depressive psychoses should first be considered. From the aromatic bodies already known to be formed during intestinal putrefaction, viz., indole, skatole, and phenol, it might be assumed that intoxication could be brought about *first*, by the inability of the cells of the body to properly oxidize these substances, *second*, by an idiosyncrasy of the individual, or a degenerate and susceptible nervous system, or both. Further, this intoxication might be produced by the formation of toxic bodies of which at present we have no knowledge.

In the infection psychoses, classed as fever delirium, infection deliria, and the post-febrile psychoses [1] which are occasionally encountered following such bacterial diseases as typhoid fever, pneumonia and influenza, the symptoms point very strongly to a poisoning of the nervous system through bacterial agency. It is a question, however, whether this action is due directly to the toxins produced by the micro-organisms, or to an autotoxin de-

* A preliminary report of this work was published in the Zentralbl. f. d. Physiol. u. Pathol. Stoffwechsels, Neue Folge, III, p. 849, 1908.

The authors are indebted especially to Professor Herter for his interest in this work, for practical aid in the form of instruction in his private laboratory, for rare reagents, and for critical suggestions.

Their thanks are also due Drs. W. E. Fisher, J. M. Keniston and A. C. Thomas of the hospital staff for clinical material, and Professor Mendel for valuable criticism.

[1] Diefendorf: Clinical Psychiatry, p. 121, New York and London, 1907.

veloped in the body as a result of the infectious disease. Psychoses owing their origin to the products of intestinal putrefaction would be etiologically analogous to the infection psychoses, and though we do not know the poisons acting in the so classified infection psychoses, still the nervous symptoms, following directly on the above mentioned infectious diseases, point very conclusively to their presence.

The detoxication of not only the products of putrefaction, such as indole, but also the bacterial toxins, has been known for a long time to take place in the liver. Phenol unites directly with sulphuric acid and potassium, forming phenyl potassium sulphate, but it is necessary for indole to first be oxidized to indoxyl before this synthetic action with sulphuric acid and potassium can take place, and indoxyl potassium sulphate be formed. The exact manner of the oxidation and conjugation of skatole is not known, though experiments show that its injection or feeding does increase the elimination of ethereal sulphates.[2] All experimental evidence points to the detoxicating action of the liver. In the recent experiments of Blumenthal[3] upon lysol poisoning a large proportion of the cresols were found to be present in the liver after autolysis. In this connection should be mentioned the work of Herter and Wakeman[4] on the action of hepatic, renal and other cells on phenol and indole which accorded the liver first place as a defensive organ. The work of Lust[5] also illustrates the protective mechanism of the liver.

There has been much discussion in regard to the formation of indole and skatole in the animal organism, especially the former. At the present time it seems beyond question that all indole is formed from intestinal putrefaction. In 1877 Jaffé[6] showed that obstruction in the small intestine in dogs caused a great increase in the elimination of indican. Clinical experience in man has been in accord with this. Ellinger and Prutz[7] have shown that obstruc-

[2] Grosser: Zeitschr. f. Physiol. Chem., XLIV, p. 320, 1905.
[3] Blumenthal: Biochem. Zeitschr., I, p. 135, 1906.
[4] Herter and Wakeman: Jour. Exp. Med., IV, p. 307, 1899.
[5] Lust: Hofmeister's Beiträge, VI, p. 132, 1905.
[6] Jaffé: Virchow's Archiv., LXX, p. 72, 1877.
[7] Ellinger and Prutz: Zeitschr. f. Physiol. Chem., XXXVIII, p. 397, 1903.

tion caused by antiperistalsis, produced by dividing the small intestine in two places a few inches apart and then joining the intervening length on the reverse way, markedly increased the indican elimination. No such alteration as this is known to be set up in any way by which intestinal decomposition can be excluded. Blumenthal[9] has maintained that some of the indican has a different origin. Rabbits under ordinary conditions excrete no indican, but during starvation, when they are living on their tissues, indican is found in their urine. Diabetic puncture in these animals also produces indicanuria. In man, Blumenthal traces certain marked cases of indicanuria to nervous disturbances. Lewin[9] found in phlorhidzin diabetes that the increased proteid destruction was accompanied by indicanuria. However, the appearance of indican in the urine during fasting has been differently explained by Ellinger[10] who found that when rabbits were muzzled so that they could not eat their own dejecta, there was no appearance of indican in the urine. Scholtz[11] repeated the experiments of Lewin with phlorhidzin and obtained negative results. Underhill[12] found that when the protein diet of dogs was largely replaced by gelatin, which contains no tryptophane group, the indican elimination was greatly reduced. Subcutaneous injections of tryptophane, which Ellinger and Flamand[13] have recently shown to be indole-aminopropionic acid, probably with the NH_2 group in the alpha position, do not increase the urinary indican in rabbits and dogs according to Ellinger's experiments with Gentzen,[14] though an injection of tryptophane into the cæcum does increase the indican output, 20-30 per cent being recovered. The work of Rosenfeld[15] entirely agrees with that of Ellinger and his coworkers. The indican is not increased either by subcutaneous injections of tryptophane or its introduction into the stomach of

[9] Blumenthal: Maly's Jahresbericht, XXXII, p. 817, 1902.
[9] Lewin: Hofmeister's Beiträge, I, p. 472, 1901.
[10] Ellinger: Zeitschr. f. Physiol. Chem., XXXIX, p. 52, 1903.
[11] Scholtz: Zeitschr. f. Physiol. Chem., XXXVIII, p. 513, 1903.
[12] Underhill: Amer. Jour. Physiol., XII, p. 176, 1905.
[13] Ellinger and Flamand: Ber. d. Deutsch. Chem. Ges., XL, p. 3029, 1907, also Zeitschr. f. Physiol. Chem., LV, p. 8, 1908.
[14] Ellinger and Gentzen: Hofmeister's Beiträge, IV, p. 171, 1903.
[15] Rosenfeld: Hofmeister's Beiträge, V, p. 83, 1903.

rabbits by means of a sound. Subcutaneous injections of indole do, however, increase the urinary indican according to Grosser.[16] When given by the stomach, 17 per cent of the indole is recovered as indican, and 30 per cent from subcutaneous injections. Skatole has been found by the same investigators to increase the elimination of ethereal sulphates, but not to such a great extent as indole. However, tryptophane, which is the mother substance of both indole and skatole, is dealt with differently by the cells of the body, in that it is completely utilized. This would naturally be expected from the fact that tryptophane is one of the normal products of pancreatic digestion.

With regard to the origin of phenol and the cresols, little need be said. It is known that they are formed in the lower intestine during putrefaction, doubtless from the breaking down of tyrosine, and it is possible that they are also formed in the course of metabolism of normal cells aside from bacterial action, then paired off with sulphuric acid and eliminated as the conjugate sulphates. Recently some experimental work has been done which shows the extent to which these compounds are burned up in the body. Blumenthal[17] found that after the introduction of the cresols into the animal organism from 20 to 25 per cent only could be recovered in the urine when the doses were moderate in amount. The work of Jonescu[18] seemed to show a difference in the oxidative power of the body toward the different cresols. He found 50 per cent of meta-cresol to be burned up, 65 per cent of ortho-cresol, and 75 per cent of para-cresol. Both Blumenthal and Jonescu found that when these bodies were administered in large quantities they were partially eliminated in the form of glycuronates. If these bodies are in excess of the ordinary oxidation of sulphur compounds, it is necessary to draw upon some other source to render them non-toxic, and suitable for elimination.

Following the discussion of the formation, the detoxication, and the extent of complete breakdown of the aromatic bodies, their toxicity must be considered. There has long been a dispute

[16] Grosser: Loc. cit. See also Porcher and Hervieux: Zeitschr. f. Physiol. Chem., XLV, p. 486, 1905.

[17] Blumenthal: Loc. cit.

[18] Jonescu: Biochem. Zeitschr., I, p. 399, 1906.

as to the toxicity of indole. In 1898, Herter [19] found that indole administered to healthy men in from 0.025 to 2.0 gram doses per day produced frontal headaches, irritability, insomnia, and confusion. He concluded that the continual absorption of enough indole to cause a constant strong reaction for indican in the urine is sufficient to cause neurasthenic symptoms. Nesbitt [20] states that twenty times as much indole or skatole as are excreted daily by an adult man may be injected into the jugular vein of a dog of 4 kilos without appreciable effect. Porcher and Hervieux [21] have recently come to the conclusion, after a long series of experiments on animals, that the compounds of the indole group are nontoxic even when administered in comparatively large amounts. Lee [22] has found that when excised muscles are perfused with a solution of indole, diluted even to 1-25,000, the amount of work they are capable of doing is decreased three fold. Phenol was also found to have an ultimate depressive effect upon the excised muscles at 1-2000 dilution. From his experiments with lysol poisoning, Blumenthal [23] came to the conclusion that the cresols have a particularly irritant effect upon the central nervous system and nerve cells, and that when the nervous system is attacked the organism seems less able to protect itself against the poison.

The most important experiments along this line have recently been made by Howland and Richards.[24] They have found that

[19] Herter: New York Med. Jour., LXVIII, pp. 89, 116, 1898.

[20] Nesbitt: Jour. Exp. Med., IV, p. 1, 1899.

[21] Porcher and Hervieux: J. Physiol. Path. gén., VIII, p. 841, 1906, also Hervieux: Comp. rend. soc. biol., LXII, p. 895, 1907.

[22] Lee: Jour. Amer. Med. Assoc., XLVI, p. 1499, 1906.

[23] Blumenthal: Loc. cit.

[24] Howland and Richards: Archives of Pediatrics, XXIV, p. 401, 1907.

Mention should be made here of the work of Juschtschenko: Arch. f. Psychiat., XLV, p. 153, 1908, which appeared shortly before proof-reading. This author determined the oxidative coefficient of individuals suffering from various forms of insanity as compared with normal individuals. The Nencki and Sieber method was employed. This consisted in administering a known quantity of benzene and determining the amount eliminated by the urine after its oxidation to phenol. Juschtschenko concluded that a disturbance of the oxidative powers of many insane was very noticeable when compared with normal individuals and that when the oxidative powers of the body decreased the toxicity of the urine increased.

when animals are poisoned with potassium cyanide so that the oxidative powers of the body are greatly reduced, the toxicity of phenol and indole is greatly intensified. After convincing themselves that the quantities of indole which they used (0.25-0.5 gram) produced no effect alone upon dogs, the animals were poisoned by repeated small doses of potassium cyanide, sufficient to produce distinct but not fatal symptoms of cyanide poisoning. Upon three dogs identical symptoms were noted. "After ten to eighteen hours, effects were evident which were not due to the cyanide alone, and which we attributed to the action of indole; a condition of stupor and semi-consciousness came on which was interrupted by periods of wild delirium, marked by frantic, incoordinate movements and shrill screaming. The delirium came on at times spontaneously, and always followed the stimulation of rough handling or rectal irritation produced by the insertion of a thermometer. This condition lasted till the death of the animals in three to seven days after the indole was given. During this period there was marked exaggeration of the reflexes, spasticity of the hind limbs, and total blindness. During the whole period, food or water was not voluntarily taken; water given by a stomach tube was sometimes retained, though there were signs of nausea. Milk, diluted milk, or beaten egg, given in the same way, was immediately vomited. Throughout the whole period there were noticed in a marked degree the typical gurgling sounds of increased intestinal peristalsis, but no feces were passed." Dogs treated similarly but with smaller doses of indole exhibited distinct but milder symptoms.

These symptoms are particularly striking because they simulate in such a marked way the symptoms of certain forms of insanity. It would seem very plausible that in psychoses such as the acute depressive psychoses, where there is a general sluggishness of the whole system, that the oxidative powers of the individuals would be diminished, and if these individuals had been so unfortunate as to inherit a defective nervous system, they might readily be influenced by the bodies of increased intestinal putrefaction, might become victims of mental unsoundness, and that in turn would bring on a gradual deterioration of the central nervous system.

The idea of autointoxication was early put forward by

Bouchard[25] and quickly accepted by the French school, but so many of his experiments were made upon an unscientific basis, and so many of his conclusions were fanciful that at the present time this work has been almost entirely disregarded. However, much of the impetus given to the study of the subject has clearly been due to the publications of Bouchard. Metchnikoff[26] states that not only is there autointoxication from the microbial poisons absorbed in cases of constipation, but that microbes themselves may pass through the walls of the intestine and enter the blood.

The probability of a toxic influence by the continual absorption of small amounts of the aromatic bodies of intestinal putrefaction has been noted especially under a condition of defective oxidation. Are there any other bodies, produced as the result of putrefaction or abnormal metabolism, which would exert an influence upon the nervous system?

Nesbitt[27] has found that when dogs are fed on a lecithin-rich diet and then the small intestine completely occluded at its lower end, choline, neurine, and perhaps other bases are produced. Choline is not markedly toxic, but neurine must be classed with the exceedingly toxic poisons. It is improbable that even the marked constipation so noticeable in certain types of insanity would be sufficient to allow of the production of these poisons, especially when we consider that the diet would not be favorable. Kukula[28] has also found, after occlusion of the intestine, a toxic substance which is soluble in alcohol and which exercises a very poisonous action.

Magnus-Alsleben[29] has obtained from the upper part of the small intestine of dogs (except when on a milk diet) a very poisonous substance which kills rabbits by respiratory paralysis, but which is inert when injected into the portal vein. A series of papers upon the toxic bases of human urine have come from Kut-

[25] Bouchard: Leçons sur les autointoxications dans les maladies, Paris, 1887.

[26] Metchnikoff: The Prolongation of Life. Eng. Edit. translated by P. C. Mitchell, p. 71, London, 1907.

[27] Nesbitt: Loc. cit.

[28] Kukula: Arch. f. Klin. Chirurgie, LXIII, p. 773, 1900.

[29] Magnus-Alsleben: Hofmeister's Beiträge, VI, p. 503, 1905.

scher's laboratory in Marburg. Kutscher and Lohmann[30] claim to have demonstrated the presence of neurine in human urine.

From experiments by Senator, Betz, Stefanio, and Emminghaus[31] it appears that very excessive formation of hydrogen sulphide may lead to an intoxication, the symptoms of which point to disordered functions of the central nervous system, including headache, dizziness, delirium, mental depression, drowsiness, stupor, and collapse. Herter[32] states that there is at present little evidence that the diamines (putrescine and cadaverine) are ever formed in sufficient quantities in the human intestine to constitute in themselves factors in the production of states of intoxication. Further, their production seems to be associated with cystinuria. There appears to be no evidence of the bacterial production of acetone in the human intestine. It is evident then that the aromatic bodies—indole, skatole, and phenol—are at present the chief factors for consideration in the question of autointoxication. In themselves they measure in quite a striking way the amount of intestinal putrefaction.

Considerable space has been given to the discussion of the products of putrefaction, and mention will be made of this subject from the standpoint of the bacteria. The colon bacillus has long been associated by pathologists with intestinal disturbances which are of a putrefactive and fermentative nature. At the present time, however, evidence seems to show that the function of B.

[30] Kutscher and Lohmann: Zeitschr. f. Physiol. Chem., XLVIII, p. 1, 1906. In this connection should be mentioned the work of Bauer: Hofmeister's Beiträge, XI, p. 502, 1908, which appeared after the writing of this article. Trimethylamine has been found to be a constant constituent of normal urine, due to the normal degradation of lecithin compounds. Bauer found that the elimination for an adult man on a mixed diet was 18 to 26 mgms. per day. In diseases due to nervous degeneration it is increased. The average elimination in tabes was found to be 51 mgms., in myelitis 59 mgms., and in dementia paralytica 37 mgms. Bauer also observed that when substances containing a choline complex, such as eggs and meat, were added to the diet the trimethylamine elimination was increased.

[31] Quoted by Herter: Bacterial Infections of the Digestive Tract, p. 230, New York, 1907.

[32] Herter: Bacterial Infections of the Digestive Tract, p. 224, 1907.

coli is a protective one [32] and that when typical putrefaction takes place, the colon bacillus is crowded to the wall (this is not always the case), and the putrefactive organisms, apparently strictly anærobic in their nature, take its place. Chief among these anærobes are B. putrificus, the bacillus of malignant œdema and the bacillus of symptomatic anthrax.

From a long and difficult study of bacterial processes in advanced anæmia, Herter [34] was able to associate the condition with an excess of B. ærogenes capsulatus among the fecal bacteria. According to the recent work of Rettger [35] this organism, though an anærobe, is primarily a fermentative organism. It often appears to be able to attack native proteins to a slight degree, but the transformation is not one of genuine putrefaction. The question of putrefaction from the bacteriological standpoint is a difficult one. There are so many factors to be considered that it is next to impossible to simulate *in vitro* the conditions found in the intestine. With regard to B. ærogenes capsulatus, in another connection, Herter [36] writes, " I think it is important to determine whether B. ærogenes capsulatus is able to produce substances injurious to the nervous system. Persons suffering from severe forms of chronic infection by this organism almost always show signs of intoxication of the nervous system, but such manifestations are very different in different individuals."

From results of experiments on dogs conducted in 1897, Herter [37] found that the injection of large numbers of B. coli into the jejunum increased the elimination of indican, that proteus vulgaris increased the ethereal sulphates but not indican, while lactic acid bacilli decreased both the indican and the ethereal sulphates.

The theory that certain forms of insanity owe their origin to autointoxication has been discussed for a long time. Many prominent physicians have long maintained, on the basis of their clinical experience, that the question of autointoxication was one which always deserved serious consideration as the cause of certain psy-

[32] Bienstock: Arch. f. Hyg., XXXIX, p. 390, 1901.
[34] Herter: Jour. Biol. Chem., II, p. 1, 1906.
[35] Rettger: Jour. Biol. Chem., IV, p. 45, 1908.
[36] Herter: Bacterial Infections of the Digestive Tract, p. 205, 1907.
[37] Herter: Brit. Med. Jour., II, p. 1847, 1897.

choses and have directed their treatment in that direction, often with gratifying results."[38] These facts, though empirical in their nature, cannot be left out of consideration. It is a matter of general concession that many of the insane suffer from various forms of gastrointestinal disease.[39]

Much significance has been attributed to the indican reaction of the urine. However, many of the statements in regard to indican have been based on qualitative work in which the total volume of the urine and the protein content of the diet were not considered. It is obvious that such observations furnish few definite data. Hamilton[40] was of the opinion from his clinical experience and the indican test that some forms of melancholia are due to the absorption of the products of putrefaction from the intestine. The results of a large number of very careful observations by Coriat[41] show a much higher elimination of indican in the depressive phase of manic-depressive insanity than in any other form of insanity. In general he found in the akinetic states a hyperindicanuria. However, in referring to this he says, "The theory that this akinetic condition is due to intestinal autointoxication of which the excessive indican elimination is merely an index, seems at first glance fascinating and satisfying. But in all my work I can safely say that I have not even the slightest proof or hint of this, nor am I led to look upon indican as an index or to refer the clinical state to the production of toxic products of proteid metabolism. . . . . For the lack of any direct proof we can easily dispose of the theory of autointoxication for the present as a factor in producing akinetic states, manifested physiologically by hyperindicanuria."

Such a careful chemist as Folin[42] after the most painstaking ex-

[38] Briggs: Bost. Med. and Surg. Jour., CLII, pp. 1, 36, 1905; CLIV, pp. 431, 464, 493, 1906.

Forchheimer: Amer. Jour. Med. Sci., CXXXIV, p. 70, 1907. Two articles have recently appeared in the American Journal of the Medical Sciences upon this subject, Orbison: "The Neurasthenia of Autointoxication," CXXXV, p. 558, 1908, and Houghton: "The Indican Reaction as Evidence of Enterogenic Intoxication," CXXXV, p. 567, 1908.

[39] Cowie and Inch: Amer. Jour. Med. Sci., CXXX, p. 460, 1905.

[40] Hamilton: New York Med. Jour., LXIV, pp. 576, 643, 1896.

[41] Coriat: Amer. Jour. Insanity, LVIII, p. 635, 1902.

[42] Folin: Amer. Jour. Insanity, LX, p. 699, 1904; LXI,, p. 299, 1904.

periments came to the conclusion that there was no "characteristic," "increase" or "diminution" of any of the urinary constituents as associated with any particular mental disorder. He made quantitative analyses of practically all the important urinary constituents. It may be noted, however, that in his examination of the depressive forms of manic-depressive insanity (cases Nos. 34, 41, 42, 43 and 49) there appeared to be a higher elimination of indican and ethereal sulphates, which fact he mentioned, but from which he drew no conclusion. Though the work of Townsend,[44] who found an excessive elimination of indican in melancholia, should not be left unconsidered, still the definite conclusions which he assumed are scarcely warranted because the analyses upon which they were based were merely qualitative. Borden,[45] by the quantitative determination of indican in the urine of insane patients on a known diet and extending over a considerable length of time, drew entirely negative conclusions. He also began his work with a study of sulphate ratio and phenol and skatole, but his results were so uniformly negative, as he stated, that he abandoned these determinations. It should be mentioned that Borden's observations were largely made on other than acute depressive psychoses.

Epilepsy has at various times been the subject of investigation.[46] In examining a large number of cases of idiopathic epilepsy, Herter and Smith found that many gave evidence of excessive intestinal putrefaction. In 1904, Masoin published a long summary of all the literature on autointoxication with especial reference to epilepsy, but there were so many conflicting statements that no conclusions could be drawn.

Mention has been made of the elimination of indican in the urine. Since indican has its origin in the indole of the feces, the relation between the two is important. Herter[47] states that one may find as much as 50 to 60 milligrams of indole by the naphthaquinone method in 100 grams of the fresh stool, probably the

[44] Townsend: Jour. Ment. Sci., LI, p. 51, 1905.

[45] Borden: Jour. Biol. Chem., II, p. 575, 1907.

[46] Herter and Smith: New York Med. Jour., LVI, pp. 208, 234, 260, 1892. Masoin: Arch. intern. de pharmacodynamie, XIII, p. 387, 1904.

[47] Herter: Bacterial Infections of the Digestive Tract, p. 245, 1907.

maximal amount, such indole production being distinctly pathological in occurrence. He further states that its production in smaller amounts, permitting the recovery of 5 milligrams in 100 grams of fresh feces, is no uncommon occurrence, and such indole production may or may not be associated with the development of intestinal, nervous, or other disturbances. Baumstark [47] regards 17 milligrams as the average for the day's stools, while Austin [48] in six cases of ileo colitis found an average daily elimination of 232 milligrams of indole and skatole in the feces. Baumstark [49] considers the fecal indole to be greater than the urinary indican. However, Baumstark made his determinations colorimetrically with Ehrlich's aldehyde, which has been found to produce color with other things than indole, thus accounting for some of his high results. Austin's figures were obtained gravimetrically after distillation, but his results appear high when compared with those of Herter, obtained by the naphtha-quinone method. Our own determinations of indole were all made with the naphtha-quinone method. Again Herter [50] states: "In persons with marked intestinal or nervous disorders, I have occasionally found in feces as much as 8 or 10 milligrams of skatole in 100 grams of feces." Phenol, though usually present in the feces, normally amounts to only a few milligrams in 100 grams of the moist stool.

Our own study of the question was made upon nine cases. Seven of these cases had been diagnosed as manic-depressive insanity in the depressive phase at the time of experiment. One case was a manic-depressive, mixed form, and another an involution melancholia.

It should be noted that our cases are classified according to the system of Kraepelin and that many of the cases referred to as melancholias by the authors quoted, would probably belong to the depressive phase of manic-depressive insanity, according to this

[47] Baumstark: Arch. f. Verdauungskrankh., IX, p. 201, 1903.
[48] Austin: Bost. Med. and Surg. Jour., CXLIX, p. 672, 1903.
[49] Baumstark: Münch. Med. Wochenschr., L, p. 722, 1903.
[50] Herter: Jour. Amer. Med. Assoc., XLVIII, p. 985, 1907.

classification. The cases under discussion were diagnosed as follows:

Case.	Psychosis.	Discharged.	Present Condition.
I. Miss A. W.	Manic-Dep., Dep. Phase.	Unimproved.	.....
II. Mrs. S. G.	Manic-Dep., Dep. Phase.	.....	Stationary.
III. Miss T. K.	Manic-Dep., Mixed Phase.	Improved.	Well.
IV. Mr. T. O'B.	Melancholia (specimens taken while patient was depressed).	Died, May 5, 1907.	.....
V. Miss M. P.	Manic-Dep., Dep. Phase.	Cured, Sept. 7, 1907.	.....
VI. Mrs. M. C.	Manic-Dep., Dep. Phase.	Cured, Nov. 2, 1907.	.....
VII. Miss L. K.	Manic-Dep., Dep. Phase.	.....	Stationary.
VIII. Mrs. A. S.	Manic-Dep., Dep. Phase.	Cured, Nov. 29, 1907.	.....
IX. Miss T. B.	Manic-Dep., Dep. Phase.	.....	Stationary.

So much attention has been accorded to the urine of the insane, especially to the presence of indican, that we determined to consider the examination of the feces as first in importance. Tests were made upon the feces for hydrogen sulphide and the Schmidt reaction, while the indole, skatole, and phenol were quantitatively determined, where they existed in sufficient quantity. A Gram's stain of the fecal bacteria was made with the idea of observing the relative number of Gram positive forms, and especially B. ærogenes capsulatus.

From the fresh feces, culture media were inoculated to ascertain the putrefactive and fermentative ability of the fecal organisms. For this purpose 400 ccm. of four culture media were employed, being incubated seven days at 37 degrees C. The media were plain bouillon, dextrose bouillon, plain bouillon plus 1 per cent calcium carbonate and dextrose bouillon and 1 per cent calcium carbonate. Indole and phenol were quantitatively determined, likewise skatole on the one occasion it was found in sufficient quantity. Hydrogen sulphide and the mercaptans were tested for qualitatively, hydrogen sulphide with lead acetate paper, and mer-

captans by the isatin method employed by Rettger.[81] At the beginning of the work the volatile fatty acids with their molecular weights were determined, also the acidity or alkalinity and the ammonia, but these were later discontinued as being of insufficient value for the amount of time consumed. Several other qualitative tests were made, including Lieben's iodoform test for acetone, the benzoyl chloride test for alcohol, the ferric chloride reaction, and the mercuric chloride or Schmidt's reaction. An examination of the bacterial flora with the Gram's stain was made here as in the feces.

Although a number of different determinations were made in the urine, chief consideration will be given to the preformed and ethereal sulphates, their ratio, indican, phenol, and the Ehrlich's aldehyde reaction. Acetone was always tested for with Legal's test and aceto-acetic acid with ferric chloride. These together with the Ehrlich's aldehyde reaction of the urine are only reported when found to be positive. The quantitative methods employed were Herter and Foster methods for indole and skatole, Kossler and Penny method for phenol, Folin's methods for total acidity, ammonia, uric acid, sulphates and creatinine, and a combination of the Ellinger and Wang methods for the indican determinations.[82] In a few of the observations creatine was determined by a modification of Folin's method.[83]

Individuals such as the depressed insane present many difficulties in the way of a metabolism study. On this account and with the idea of observing the patients under their usual conditions, they were allowed to partake of their customary diet, the nature and quantity being noted roughly. In a study of this kind, the protein content of the diet is necessarily of first importance, but it was thought that the abnormalities if present would be shown

[81] Rettger: Jour. Biol. Chem., II, p. 71, 1906.

[82] Herter and Foster: Jour. Biol. Chem., II, p. 267, 1906. Kossler and Penny: Zeitschr. f. Physiol. Chem., XVII, p. 117, 1893. Neuberg modification: Ibid., XXVII, p. 123, 1899. Folin: Amer. Jour. Physiol., XIII, p. 49, 1904. Folin: Jour. Biol. Chem., I, p. 131, 1905. Ellinger: Zeitschr. f. Physiol. Chem., XXXVIII, p. 178, 1903. Also Wang: Ibid., XXVII, p. 135, 1899.

[83] Benedict and Myers: Amer. Jour. Physiol., XVIII, p. 397, 1907.

I.—ANALYSES OF THE FECES.

Case Number.	Date.	Amount, gms.	Percentage of Water.	Reaction to Litmus.	Hydrogen Sulphide.	Calculated for 100 gms. Moist Feces.			Schmidt's Reaction.	Gram Picture. Positive or Negative.
						Indole.	Skatole, mgms.	Phenol, mgms.		
I	Mar. 13	84.	88.		—	—	Trace.	12.	—	—
II	Mar. 16	300.	74.		Faint reaction.	—	2.6	15.4	Faint reaction.	—
III	Apr. 12	309.	71.		+	—	Faint trace.	13.5	Faint reaction.	+—
	May 17	404.	84.		++	Faint trace.	Faint trace.	27.	—	+
	June 12	35.	Low		—	—	Very faint tr.	20.3		+—
	June 13	227.	86.		—	—	Do.	8.9	Slight reaction.	
	June 14	67.	84.		Very faint tr.	—	Do.	59.7	Do.	
IV	Apr. 5	415.	73.		—	Trace.	—	12.8	+	+—
V	Apr. 7	304.	78.	+	Trace.			9.6	++	+—
	Apr. 8	94.	79.	—	—	Slight reaction.	Slight reaction.	30.		+—
	June 30	122.	87.	—	—	Do.	Do.	27.2	Slight reaction.	+—
	July 1	20.				Do.	Do.	20.		
VI	Apr. 22	60.	74.		—	—	—	23.4	+	+
	May 16	130.	69.	—	—	—	Very f't reaction.	16.9	Faint reaction.	+—
	June 1	115.			+	Trace.	—	26.1	+	+—
	June 18	68.		+—	—	Small amount.	—	36.2	+	+—
	June 21	30.		+—	—	Faint reaction.	—	20.1	Slight reaction.	—+
	July 24	188.	82.		++	Do.	—	13.9	+	—+
	July 25	149.				Do.	Faint reaction.	4.	+	—+
VII	Aug. 21	92.	64.		Slight reaction.	—	Faint reaction.	31.6	+	+—
	Aug. 22	104.	80.		Do.	—	—	19.9	+	+—
	Aug. 23	55.	91.		—	—	Faint reaction.	9.2	—	
VIII	Sept. 6	188.			+	Trace.	Deep purplish brown reac'n.	4.3	+	+—
	Sept. 11	49.				Faint trace.			—	+—
	Sept. 12	129.			++			11.6	+	+—
IX	Aug. 26	15.			+	—	Faint reaction.	35.	Faint reaction.	+—
	Aug. 27	39.			+	—	Do.	31.7	++	+—

II.—ANALYSES OF THE URINE.

Case Number.	Date.	Volume in ccm. / Specific Gravity.	Reaction to Litmus.	Total Acidity, N/10 ccm.	Ammonia, N/10 ccm.	Creatinine, gms.	Creatine, gms.	Uric Acid, gms.	Inorganic Sulphates, gms.	Ethereal Sulphates, gms.	Sulphate Ratio.	Indican, mgms.	Phenol, mgms.	Ehrlich's Aldehyde Reaction.	Legal's Test for Acetone.
I	Mar. 13 and 14	648. 1.026	Acid.	259.	306.	.678	.070		1.619	.157	1-10	1.5	52.9	+	
II	Mar. 16 and 17	950. 1.014	Acid.	242.	160.	.545	.035		.859	.133	1-7	1.1	58.5	+	
III	Apr. 1 and 2	874. 1.027	Acid.	602.	371.	.786	.185		1.379	.096	1-15	Much	16.2		
	May 17	810. 1.024	Neutral.	75.				.258	.674	.106	1-6	"	102.9		
	June 13	355. 1.027	Acid.	292.	145.	.533		.178	.824	.082	1-10				
	June 14	500. 1.018	Acid.	210.	140.	.526		.176	.620	.101	1-6				
	June 15	300. 1.027	Acid.	150.	100.	.410		.162	.506	.083	1-6				
IV	Apr. 5	1380. 1.019	Acid.	265.	447.	1.433	None	.452	2.124	.311	1-7	4.4	72.3		
V	Apr. 8	2070. 1.010	Acid.	457.	365.	.707	.262	.287	1.573	.241	1-6	4.4	68.6		+
	June 30	2480. 1.006	Alkaline.	130.		.638	.078	.195	.569	.198	1-3	4.	64.2		
	July 1	2500. 1.005	Alkaline.	460.		.710	.125	.150	.624	.206	1-3	4.	73.2		
	July 3	2100. 1.005	Alkaline.	109.		.279	.114	.197	.462	.214	1-2	3.	34.3		
	July 4	1665. 1.006	Alkaline.	47.		.380	.089	.150	.414	.127	1-3	2.9	30.8		
VI	Apr. 22 and 23	733. 1.013	Acid.	208.	207.	.912	.171	.426	1.997	.136	1-14	Tr.	48.5		
	May 16 and 17	578. 1.024	Acid.	268.				.156	1.353	.273	1-5	1.4	130.9		
	June 1 and 2	1077. 1.017	Acid.	159.				.125	.802	.101	1-8	4.1	21.9		
	June 18	1500. 1.015	Acid.	102.	246.			.236	.897	.278	1-3		197.4		
	June 19	1370. 1.018	Acid.	138.	261.			.252	1.042	.243	1-4	7.3	103.2		
	June 21	910. 1.020	Acid.	278.	216.			.188	.884	.407	1-2	3.1	135.8		
	July 24	1620. 1.020	Acid.	279.	399.			.510	2.091	.438	1-5	3.7	149.6		
	July 25	1230. 1.018	Acid.	285.	398.			.442	1.824	.572	1-3	3.2	110.8		
VII	Aug. 21	655. 1.021	Acid.	152.	147.	.663		.318	1.253	.116	1-11	2.9	43.		+
	Aug. 22	1030. 1.021	Acid.	281.	177.	.834		.423	1.655	.332	1-5	2.5	77.4		+
	Aug. 23	1530. 1.011	Acid.	282.	282.	.652		.293	.700	.304	1-2	3.8	39.1		Tr.
IX	Aug. 26	1445. 1.015	Acid.	414.	277.			.656	2.196	.329	1-6	6.2	91.1		
	Aug. 27	1030. 1.012	Acid.	108.	181.			.243	.878	.175	1-5	1.4	128.7		
	Aug. 28	1250. 1.016	Acid.	130.	230.			.412	1.141	.263	1-4	2.5	178.		

as well upon their usual diet as any other. At first the study was made in two-day periods, taking the average of the two twenty-four-hour urines as the basis of the urine determinations, as the tables show. This was later abandoned and the study made to extend over several consecutive days.

In the following tables the sulphates were computed in terms of sulphuric acid, the indican in terms of indigotin, and the phenols and cresols collectively in terms of phenol.

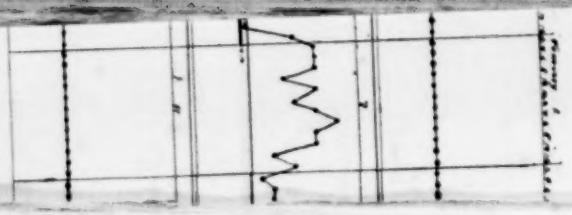
The usual clinical examinations were made in the urines tabulated above. The microscopical examination of Case III showed a moderate number of pus cells. Case V was suffering from cystitis at the time of experiment and the bladder was being washed with boracic acid solution, hence the high volume of urine. A trace of albumen was regularly found in the urine and many pus cells. On account of the reaction of the urine, the creatine and creatinine estimations are of little value. The microscopical examination of the urine in Case VI revealed the presence of a few hyaline casts and a few pus cells. Likewise in Case VII a few leucocytes and a few casts of a granular nature were observed.

In the several instances in which the urines collected covered two-day periods, the volumes given represent the twenty-four-hour average, the analyses being computed on this basis.

In the following table, giving the analyses of the culture media, plain bouillon is represented by "A," plain bouillon plus 1 per cent calcium carbonate by "B," dextrose bouillon by "C" and dextrose bouillon plus 1 per cent calcium carbonate by "D."

In Cases I, II, and IV, and in the first observations on Cases III, V, and VI, determinations of the acidity or alkalinity, ammonia and volatile fatty acids, with their molecular weights, were also made, but for the sake of uniformity they have not been tabulated. In Case V the volatile fatty acids, total acidity and ammonia were all very high, but further than this no particular abnormality was observed.

CASE I.—Miss A. W., aged 20. The patient was suffering from her first attack of manic-depressive insanity of seven months' duration at the time of experiment. She presented marked psychomotor retardation, many self-accusatory and isolated somatic delusions, also constant morbid dejection. She was oriented and memory was undisturbed. Physically, she



III.—ANALYSES OF CULTURE MEDIA INOCULATED FROM FECES.

Case Number.	Date.	Media.	Hydrogen Sulphide.	Mercaptans.	In 100 ccm.			Acetone.	Alcohol.	Diacetic Acid.	Schmidt Reaction.	Gram Picture.	Media.	Hydrogen Sulphide.	Mercaptans.	In 100 ccm.			Acetone.	Alcohol.	Diacetic Acid.	Schmidt Reaction.	Gram Picture.
					Indole, mgms.	Skatole, mgms.	Phenol, mgms.									Indole, mgms.	Skatole, mgms.	Phenol, mgms.					
I	Mar. 13	A	—	—	64.	—	9.2	—	—	—	—	+—	C	—	—	—	—	6.2	—	—	—	—	+
		B	++	+	41.	Faint trace.	12.9	—	—	—	—	+	D	+	++	Trace.	—	7.4	—	—	—	—	+
II	Mar. 16	A	+	—	43.6	—	7.4	+	—	—	—		C	—	—	Very faint tr.	—	3.7	++	+	—	—	+
		B	—	+	19.5	—	5.9	—	—	Tr.	—	+	D	—	—	Trace.	—	4.6	+	—	—	—	+
III	Apr. 1	A	++		69.4	—	4.9	—	—	—	—	+	C	—	—	—	—	18.5	—	Tr.	—	—	+
		B	++	Tr.	4.	—	4.3	—	—	—	—	+	D	+	—	—	—	8.	—	—	—	—	+
	May 17	A	++	—	3.1	—	13.2				—	+	C	—	—	—	—	4.9				—	+
		B	++	—	1.2	—	2.5				+	+	D	++	++	Faint trace.	Faint trace.	7.7				—	+
	June 14	A	++	—	16.	—	5.6				+	+	C	—	—	—	—	2.8				—	+
		B	++	—	13.1	—	5.9				++	+	D	++	Tr.	8.8	—	4.				—	+
IV	Apr. 5	A	+	Tr.	21.2	—	8.3	Tr.	—	+	+	+—	C	—	—	—	—	1.8	—	—	—	—	+—
		B	Tr.	—	50.7	—	7.1	Tr.	—	++	+	+—	D	Tr.	—	Faint trace.	—	3.1	—	—	+	—	+—
V	Apr. 1	A	+	+	17.6	—	8.	Tr.	—	+	+	+	C	—	—	Faint trace.	Very faint tr.	4.3	—	—	—	—	+—
		B	+	+	18.6	—	10.4	Tr.	—	+	+	+—	D	Tr.	—	Faint trace.	—	2.2	—	—	Tr.	—	+—
	July 4	A	—	—	15.4	—	12.				+		C	—	—	—	—	5.9				—	
		B	—	—	10.6	—	16.3				+		D	Tr.	+	16.	—	9.2				—	

ANALYSES OF CULTURE MEDIA INOCULATED FROM FECES.—Continued.

Case Number.	Date.	Media.	Hydrogen Sulphide.	Mercaptans.	In 100 ccm. Indole, mgms.	In 100 ccm. Skatole, mgms.	In 100 ccm. Phenol, mgms.	Acetone.	Alcohol.	Diacetic Acid.	Schmidt Reaction.	Gram Picture.	Media.	Hydrogen Sulphide.	Mercaptans.	In 100 ccm. Indole, mgms.	In 100 ccm. Skatole, mgms.	In 100 ccm. Phenol, mgms.	Acetone.	Alcohol.	Diacetic Acid.	Schmidt Reaction.	Gram Picture.
VI	Apr. 22	A	++	—	217.6	—	93.3	—	—	—	—	+—	C	—	—	—	—	14.5	—	—	—	—	+
		B	++	—	63.8	—	68.7	—	—	—	—	+	D	++	—	9.2	—	65.	—	—	—	—	+
	May 16	A	++	++	122.4	—	29.3				—	+	C	—	—	—	—	4.3				—	+
		B	++	++	47.8	—	33.				—	+	D	++	++	Small amt.	—	40.				—	+
	June 1	A	++	—	7.4	—	18.5				—	+—	C	—	—	—	—	4.3				—	+—
		B	—	—	57.2	Trace.	16.				—	+—	D	++	—	10.	—	5.6				—	+
	June 18	A	—	—	26.6	—	5.9	—	—	—	—	+—	C	—	—	—	—	4.	—	—	—	—	+
		B	—	—	26.8	—	5.9	—	—	—	—	+	D	++	+	14.2	—	10.2	—	—	—	—	+
	July 24	A	—	—	—	Trace.	7.1	—	—	—	—	—+	C	—	—	—	—	69.9	—	—	—	—	+
		B	++	—	Trace.	3.	5.2	—	—	—	Tr.	—+	D	++	—	Trace.	Faint trace.	22.2	—	—	—	—	+
VII	Aug. 21	A	++	—	7.4		2.8	—	—	—	Tr.	+—	C	—	—	—	Very faint tr.	1.8	—	—	—	—	+
		B	++	+	12.		10.5	—	—	—	+	+—	D	++	+	7.8	—	6.8	—	—	—	—	+—
VIII	Sept. 6	A	+	+	15.7	—	7.8				+		C	—	—	—	—	8.3				—	
		B	+	+	13.8	—	15.1				+		D	++	+	13.6	—	4.				Tr.	
IX	Aug. 27	A	+	—	138.	Trace.	13.9	—	—	—	—		C	Tr.	—	—	—	11.	—	—	—	—	
		B	+	—	165.	—	16.6	—	—	—	—		D	+	—	Trace.	—	4.6	—	—	—	-	

was anæmic, tongue was coated, and she suffered from anorexia and constipation.

Her diet consisted largely of milk, together with a small amount of meat and other foods.

As regards Case I, little can be said. None of the analyses show any particular abnormality. It may be noted that a trace of skatole was found in the feces and that a positive Ehrlich's aldehyde reaction was observed in the corresponding urine.[54]

Case II.—Mrs. S. G., aged 58. Patient had suffered from recurring attacks of manic-depressive insanity of short duration and with lucid intervals of several months for five years. At the time of the experiment, she showed marked depression, moderate retardation, and persistent self-condemnatory delusions. In reaction to these delusions, she exhibited some considerable agitation. There were no disturbances of perception or apprehension and she was well oriented. There was no evidence of deterioration. Physically, she was poorly nourished and presented a moderate degree of arteriosclerosis.

At the time of the experiment, the patient was living upon an ordinary mixed diet, containing a moderate amount of protein material.

Case II affords little for comment. Sufficient skatole, however, was found in the feces to make possible a quantitative colorometric determination. Again we note a reaction with Ehrlich's aldehyde in the urine. The sulphate ratio is a little low, but nothing that could be called distinctly pathological was observed. In a previous study of the creatine elimination of this individual, considerable creatine was found, possibly due to under-nutrition.[55]

Case III.—Miss T. K., aged 37, was suffering from her second attack of manic-depressive insanity of the mixed form of five weeks' duration. At the time of the experiment she had just passed through the crisis of her attack, and was somewhat feeble and emaciated. She was, however, still suffering from active visual hallucinations and various unstable, expansive and depressive delusions, while her emotional attitude varied from ecstacy to profound dejection, the latter predominating. Orientation throughout remained good and memory unimpaired. There were five experiments, which extended over two months, during which time she improved rapidly and at the time of the last test was perfectly normal.

The patient subsisted upon an ordinary mixed diet containing milk and a moderate amount of protein material.

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[54] Herter: Jour. Biol. Chem., I, p. 251, 1905, also IV, p. 403, 1908.

[55] Benedict and Myers: Amer. Jour. Physiol., XVIII, p. 406, 1907.

The stools were constipated which necessitated the use of saline cathartics in securing specimens.

In this case some of the determinations were incomplete, but those made demonstrated little abnormality; the sulphate ratios were somewhat low on the last observations, and the quantity of phenol in the feces during the same observation was high, as was the indole from the flasks.

CASE IV.—Mr. T. O'B., aged 55, was suffering from melancholia of involution of three months' duration. Hallucinations of sight and hearing of a depressive nature were present. He expressed many self-accusatory delusions, and emotionally there was considerable morbid anxiety and marked dejection. Apprehension was good and orientation perfect. The content of thought was self-centered and speech consisted in a repetition of mournful expressions. There was no retardation, but agitation was quite pronounced. Physically, he had anorexia, faulty nutrition, marked constipation, tremor of tongue, hands and fingers, slight ataxia, increased deep reflexes, and slight muscular weakness. Patient died one month after experiment.

His diet consisted largely of bread and milk with a small amount of meat and other foods.

In Case IV the urine shows a decidedly low ratio for the sulphates, the indican and phenol determinations corresponding with this.

CASE V.—Miss M. P., aged 28, was suffering from her second attack of manic-depressive insanity, depressive form, the first being manic. There was pronounced retardation, a few ill-defined self-condemnatory delusions and pronounced despondency. There was little voluntary speech, but orientation was good and memory unimpaired. Physically, nutrition had suffered to only a slight degree, and there was some insomnia.

During experimentation, diet was limited almost entirely to milk which she took only after persuasion.

In this case we find a uniformly low sulphate ratio, with a high ethereal sulphate elimination. Corresponding with this the phenol is exceedingly high, as is also the indican. Furthermore, the phenol of the feces during the last three observations was above normal. The increase in putrefactive products in the urine is especially noteworthy as occurring in a subject on a milk diet. Mention should be made of the fact that albuminuria was present, and that the patient was suffering from cystitis.

CASE VI.—Mrs. M. C., aged 46, was suffering from the third attack of manic-depressive insanity, depressive form. The prominent symptoms were marked retardation, delusions of self-accusation, anxiety, marked dejection and a well-defined feeling of inadequacy. Apprehension was good, consciousness clear, memory unimpaired, and there were no hallucinations. Physically, there was considerable insomnia, anorexia, and faulty nutrition with constipation.

There were seven different experiments upon this subject at intervals covering four months, during the first three of which her condition remained unchanged, while during the last four there was a slight amelioration of the symptoms. The diet was composed largely of milk.

This was perhaps the most striking case examined. The sulphate ratio after the first examination was always low, and the ethereal sulphates high. A good quantity of indican was observed, and the urinary phenol was very high, the highest recorded, especially so during the last observations, at which time there was a slight amelioration of her mental symptoms. The phenol of the feces was perhaps a little high during some of the intermediate observations. A very marked production of indole and also phenol was noted in the flasks during the first two observations. They then gradually decreased in quantity, though on the last observation the phenol was again rather high, and skatole was observed in the absence of indole.

This patient rapidly improved mentally after the last examination and three months later was discharged recovered.

CASE VII.—Miss L. K., aged 63. This patient for many years had suffered from alternating attacks of manic-depressive insanity without intermissions. At the time of the examination, she was in a depressive phase of several months' duration and showed considerable retardation. Her voluntary speech was almost nil, while the answers to questions were monosyllabic. Emotionally, despondency was pronounced and occasionally self-condemnatory delusions were expressed; otherwise, orientation was good and there were no hallucinations. Physically, she was well nourished.

The diet of the patient was a mixed one containing the usual amount of protein material.

On the last two days of this experiment the sulphate ratios were comparatively low, still neither the indican nor phenol were particularly high. The urine reacted to Legal's test for acetone, and a few casts were noted microscopically.

CASE VIII.—Mrs. A. S., aged 68, for many years had suffered from frequently recurring attacks of manic-depressive insanity, all of which were of the depressive phase, with lucid intervals of about eight to twelve months' duration. At the time of the examination, she presented a slight degree of retardation, considerable despondency with a feeling of inadequacy and vague delusions of misfortune. Physically, nutrition was below par, she suffered from anorexia, and the stools were very much constipated.

During experiment the patient lived upon her customary diet, containing a moderate amount of protein material.

Because of extreme constipation, the stools, which were obtained by the use of saline cathartics, were semi-liquid; they were also light brown or greenish in color and offensive in odor.

In regard to this case little can be said. As the volumes of urine were small in this case and consequently a number of the determinations incomplete, and further, as the results which were obtained were entirely negative, they have not been tabulated.

CASE IX.—Miss T. B., aged 29, was suffering from her third attack of manic-depressive insanity of eight months' duration. The attack began as a manic phase, but developed in the fourth month into the depressive phase, which had been in duration 16 weeks at the time of the experiment. There was slight retardation of thought, attention and action, and considerable emotional depression with anxiety. She exhibited no hallucinations or delusions, while her orientation was good and memory unimpaired. Physically, she was in good nutrition.

Her diet during experimentation consisted of a moderate amount of protein material together with the other customary foods.

In this case we note a low sulphate ratio, high ethereal sulphates, high phenol, very high on last observation, and a rather high indican on first observation. A good quantity of phenol was found in feces, and the bacteria in the flasks seemed prone to a high production of indole.

Since the Schmidt's reaction, and the Gram picture in both the feces and the flasks could not be correlated in any way with the cases, little mention will be made of them in that connection.

In Case II only a faint Schmidt reaction was observed in the feces. Stronger reactions were obtained in Cases VI and IX. However, in Cases III, IV, V, VII, and VIII, the reaction was observed in both the feces and culture media. Apparently there is a bacteriological relation between the reaction in both feces and flasks. While the reaction in the feces was not always followed by

a reaction in the media, in every case where the reaction was observed in the flasks, it had previously been observed in the feces. In other words, the feces must contain the proper bacterial flora. Herter[56] states that "In the course of a systematic examination of the feces from normal individuals and from many pathological series it was noted that the mercuric chloride reaction was strongest in persons suffering from intestinal disorders, especially in those with intestinal putrefaction." The substance with which the mercuric chloride reacts in the feces has been supposed to be hydrobilirubin, but the observations given above of the reaction in culture media (on several occasions a very strong reaction was obtained) would hardly support this idea. The amount of feces employed for media inoculation was so small that this could hardly account for the reaction in 10 cubic centimeters of media. Further, it would hardly seem probable that blood pigments could have existed in the beef extract of the culture media in sufficient quantity to account for the formation of a substance like hydrobilirubin under the action of micro-organisms, especially when hydrobilirubin is formed by a reducing action. The Schmidt[57] reaction must be due to some product of bacterial action, but the above observations indicate that it is not hydrobilirubin. In testing the reaction in the culture media, a small amount of mercuric chloride was placed in a test tube and about 10 cubic centimeters of media added, the tube corked, shaken and allowed to stand twenty-four hours. At the end of that time the reaction was recorded. Our later examinations of the feces were performed in a similar manner. Unfortunately the above reactions were not compared with Jaffé's zinc chloride reaction for hydrobilirubin. It is our intention to investigate further the Schmidt reaction in the culture media, with the idea of isolating and identifying the bacterial product producing the reaction.

The bacterial flora of both feces and culture media were stained by Gram's method. Though in a number of instances there seemed to be a rather large number of long thick Gram positive bacilli simulating B. ærogenes capsulatus, still conclusions can scarcely be drawn from these observations as they were much at variance.

[56] Herter: Bacterial Infections of the Digestive Tract, p. 145, 1907.
[57] Schmidt: Verhandl. d. Cong. f. inn. Med., XIII, p. 320, 1895.

As a matter of routine, Lieben's iodoform test for acetone was applied to a distillate of the feces. Although acetone is not generally supposed to be found in the feces, a strong reaction was obtained in several instances. However, on account of the unreliability of many such qualitative reactions, they were left untabulated.

Summary.

The chemical analyses of the feces revealed nothing which could be called distinctly pathological, though skatole was once found in small quantity (2.6 mgms. per 100 gms. feces) and in many instances the phenol was very high, much higher than that observed by Herter in his cases of advanced anæmia. Herter found the average elimination to be about 9 mgms. while here it was slightly over 20 mgms. Indole was found in traces only.

In Case VI strong indications of intestinal putrefaction were obtained from the analyses of the culture media. On one occasion 218 mgms. of indole and 93 mgms. of phenol were obtained from 100 ccm. of culture media. On a later examination in the absence of indole, 3 mgms. of skatole were obtained. In Case IX a marked production of indole was observed in both the plain bouillon and in the plain bouillon and calcium carbonate.

In the urine examinations of Cases V, VI and IX, the ethereal sulphates were all high with low sulphate ratios. In these same cases the phenol values were all considerably above the normal, while on some occasions the indican was possibly a little high.

Three of the nine cases examined, viz., V, VI, and IX, especially V and VI, gave considerable indication of intestinal putrefaction. The diet of both Cases V and VI was almost exclusively of milk and that makes these observations all the more remarkable. These two cases have both been discharged as recovered, while the condition of Case IX remains stationary, symptoms of mental depression still being exhibited.

It would seem that in the psychoses studied, the question of autointoxication or more properly autoinfection was one which should always be considered, at least as an influencing factor; although at the present time the analytical data are insufficient to ascribe definitely certain nervous or other disorders to an autointoxication.

A CASE OF CENTRAL NEURITIS WITH AUTOPSY.*

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AND

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(From the wards and laboratory of the Danvers Insane Hospital.)

Introduction.

In 1897 Meyer, in describing various pathological changes in the Betz cells of the motor cortex, reported the findings in a case of melancholia of the involution or senile type, in which the alteration in the Betz cells, known as the axonal reaction, was present.[1] During the following three years, he was able to collect eight cases in which this reaction occurred, and he published these cases, with others found in the literature, under the title of " Parenchymatous systemic degenerations mainly in the central nervous system."[2] For this rather long and cumbrous title he substituted the name " Central Neuritis."

This condition, which was regarded as terminal, was found to occur in psychoses that were, as a rule, depressive in character at the onset. It occurred at the involution period, as well as in alcoholic-senile states and in alcoholic-phthisical-cachetic states. Banal cachexias and infections appear to have no direct relation to central neuritis, a fact that is verified by the rather rare occurrence of this condition in a great number of autopsies. The association of central neuritis with depressive mental states is striking but unexplained.

* Read at the annual meeting of the American Medico-Psychological Association, Cincinnati, Ohio, May 12-15, 1908.

[1] Adolf Meyer. Demonstration of various types of changes in the giant cells of the paracentral lobule. Am. Jr. Ins., Vol. LIV, October, 1897, No. 2.

[2] Adolf Meyer. Parenchymatous Systemic Degenerations Mainly in the Central Nervous System. Brain (Part XCIII, 1901).

The clinical symptoms are described as rather vague, occurring suddenly where no organic lesion was suspected; difficulty in locomotion, increased weakness of co-ordinated movements, at times jactitation of the limbs and rigidity, disorders of the reflexes, together with diarrhea and occasional febrile fluctuations. The mental condition in this terminal state is an anxious, perplexed agitation, delirium or stupor, not unlike a protracted delirium tremens.

The lesions in these described cases are distributed throughout the cortex, cerebellum, cord and spinal ganglia and also in the sympathetic ganglia. In some of the reported cases, peripheral neuritis was also present.

In two cases of polyneuritic delirium reported by Sims, axonal reaction was present in the anterior horn cells of the cord, Clarke's column, and many cranial nerve nuclei, and in one case this reaction was present in the Betz cells of the motor cortex.[1]

Aside from these cases, nothing has appeared in the literature in regard to this condition. Drs. Southard and Hodgkins[2] found the axonal reaction generalized in a case of epilepsy, and pointed out the striking reduction of consistence in the brain (encephalomacia autolytica).

That the condition (central neuritis) can be recognized from its symptoms and established anatomically is no longer in doubt and has been repeatedly demonstrated at the Worcester and Danvers insane hospitals.

The possibility of remissions during the course of this condition was suggested by Meyer and has been since observed.

Clinical History.[3]

E. S. H., æt. 40.

Family History.—Negative, except that father died of cancer.

Personal History.—Early development normal. No peculiarities known. No serious illness. Married æt. 20, and married life was happy until five years ago when husband's infidelity became known to the patient. Three

[1] F. Robertson Sims. Anatomical Findings in Two Cases of Korsakoff's Symptom-Complex. Jour. Nervous and Mental Diseases, March, 1905.

[2] Note on Cell Findings in Soft Brains. E. E. Southard and M. B. Hodgkins. Am. Jr. Ins., Vol. LXIV, No. 2, 1907.

[3] We are indebted to Dr. H. M. Swift of the Danvers Insane Hospital for the excellent initial mental and physical examination.

years ago husband brought home a woman from Porto Rico, which event completely upset the patient and she had some sort of a fit which lasted several hours. She was semi-stuporous for several days after this, and her mental trouble dates from this time. She brooded a great deal over the wrongs done her by her husband and gradually a change of disposition was noted. She neglected the children and seemed to lose interest in everything. Her son states that marked depression has been present for one year only. She was restless, walked the floor a great deal, wringing her hands. Delusions of persecution were prominent; she thought that everyone was against her, that her children were trying to kill her and that the neighbors were going to poison her. For two months before admission she became gradually worse. During the day she was inactive, refused to answer questions. At times she was much agitated and showed marked affect of fear. At other times she was sleepless at night. She thought something was going to happen to her children and was violent to her children without cause. Two days before admission she made a feeble attempt at suicide.

She was committed to the Danvers Insane Hospital September 10, 1906, and at time of admission she was somewhat depressed and agitated. She was restless, constantly rubbing her head with her hands and wringing her hands. She had an anxious, worried facial expression. Questions were answered relevantly and her conversation was coherent. She was willing to answer most questions, and was moderately communicative. She talked in a rather low tone and often slowly. During the tests for school knowledge she often asked examiner to stop as it was too much of an effort for her to think. She frequently repeated, "Oh dear me," but would not explain her agitation.

Consciousness and Orientation.—Patient's consciousness was not clouded and she was well oriented for time, place and persons. She had a good grasp upon her surroundings and a fair knowledge of current events.

Intellect.—Probably defective. Patient exhibits a rather scanty fund of information. School knowledge poorly retained. Calculating ability was defective. She was able to perform only the most elementary problems.

Memory.—Good for remote events, except for exact dates. Patient was able to give a consistent account of her life. Children's names and birthdays given correctly. For recent events her memory was fair. Retentive memory good.

Mental Attitude.—One of consistent depression with slight agitation. Spontaneous thought apparently sluggish. There was a suggestion of retardation as shown by some tests. She usually answered after a short pause. She spoke in a low tone and without animation, but not particularly slowly. She was able to count rapidly.

Attention.—Was difficult to obtain. Patient showed difficulty in concentrating her attention for problems, although she was able to count raps on the table when rapidly executed. No *hallucinations* could be demonstrated.

Delusions.—Depressive ideas and vague ideas of persecution were present. She maintained that she felt queer and that the neighbors might have poisoned her. No attempt at systematization. No true *insight* into her condition.

Physical Examination.—Height, 5 feet 4½ inches. Weight, 128 pounds. A fairly well-nourished woman. Complexion pale with lemonish tinge (hemaglobin found to be 50-60 per cent). Brown hair, streaked with gray. Dry scaly areas on inner side of left ankle and higher up on leg three small irregular scars.

Respiratory System.—Diminished breath sounds over the right side of the chest, both anteriorly and posteriorly. Slight dulness on percussion over the right lung posteriorly with increased fremitus.

Circulatory System.—Pulse regular, 70. Radial arteries not thickened. Apex beat is inside mamillary line. No enlargement of the heart.

Abdomen.—Negative.

Urine.—Slight trace of albumen. Specific gravity 1011. Slightly alkaline in reaction. No casts.

Neuromuscular Condition.—Negative.

Reflexes.—Knee-jerks and achilles brisk. Plantars and abdominals present. Forearm reflexes brisk.

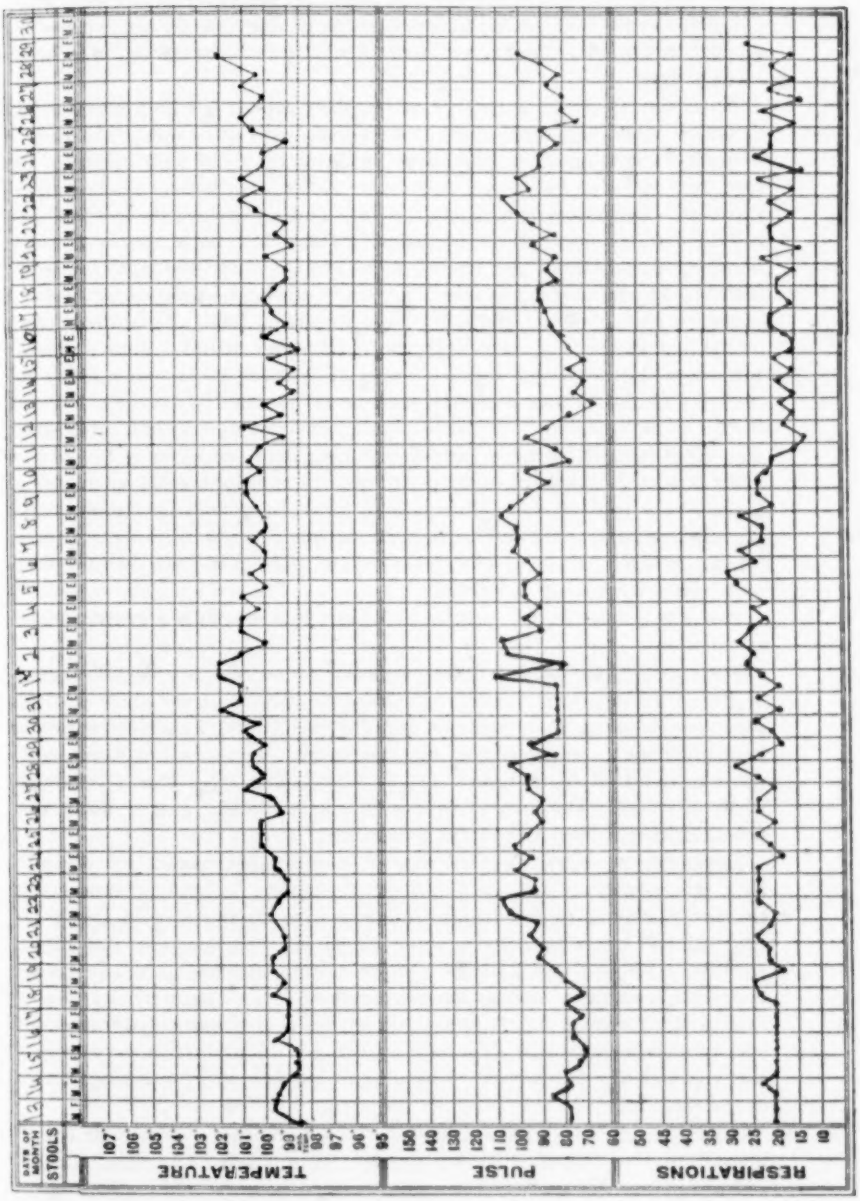
Pupils.—Equal, central and regular; react promptly to light and accommodation.

Progress of the Case.—Patient continued much depressed and emotional and was frequently found crying. Soon after admission she complained of great weakness, which she claimed was increasing. She was very inactive and this was probably due to weakness rather than retardation. On one occasion she vomited. She became more apprehensive and feared she would not recover. On September 24, she complained of having numerous loose movements. At this time her temperature began to rise. (See chart.)

October 15. Patient was put to bed because of general weakness. Twice during the night *she had fallen when going to the toilet room.* Once she was faint, and the nurse thought she was unconscious, but the other time she was not unconscious. She *maintained that her legs were too weak to hold her.* She was somewhat apprehensive and consciousness was quite clear. She had a good appetite. Urinary examination at this time negative. Appetite was very good. For a month patient continued to have loose movements day and night, but no pain accompanied them and no mucus or blood was present in the stools. Internal medication gave no relief. Mental condition much improved. She was less depressed and apprehensive and talked in a rational manner.

Blood Examination.—November 6. Reds, 3,757,705; whites, 4380; hemoglobin, 60 per cent.

November 17. A great change was noticed in patient. For several nights she had been delirious. Consciousness not altogether clear. Gives the date as December 20. Could not remember names of physicians. At this time a slight but rather constant twitching of the hands, fingers,


TEMPERATURE
PULSE
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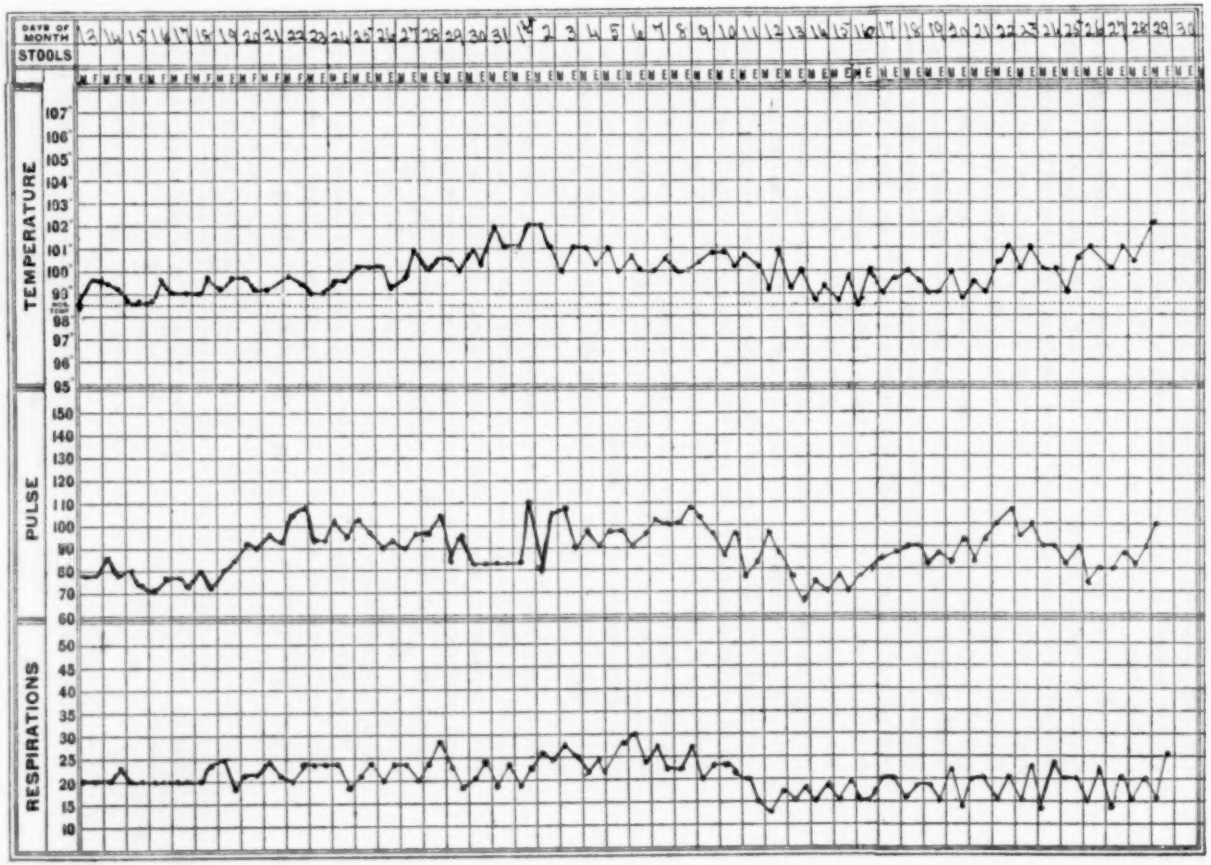
No. NAME. E. H.

DATE October 13 - 1906. November



lower jaw and toes was present and equal on both sides. Memory good. Gives the exact time of her hospital residence and time in bed. From the clinical symptoms present a diagnosis of "central neuritis" was made on this date.

November 19, 1906. For the past few days patient has been more or less delirious, especially when alone. However, upon questioning she can be brought to consciousness and gives evidence of being well oriented. At first says this is Lawrence, but upon being questioned, changes it to Danvers. Knows approximately the date and recognizes those about her, calling doctors and nurses by name. There has been almost constant fibrillary twitching of the hands, arms and legs for the past few days, jactitory in character, together with some stiffness in the neck muscles, backache and moderate stiffness of the arms and legs. Patient's diarrhea has been improved by warm irrigation and silver nitrate solution ordered for every day with salt solution enemas. Patient shows no marked depression except crying at times. There is no marked anxiety, but evidently some confusion. She has a good appetite and would eat all that was given her. Now takes only liquid diet; does not sleep well. Always more confused and delirious at night. When confused, calls out names of family. No evidence of hallucinations. Patient visited by daughter and friend yesterday. She recognized them, but refused to converse, often saying, however, she was glad to see them. Did not know her people at first. Now somewhat perplexed.

Vision.—Counts fingers at distance of one foot, but makes many mistakes at first.

Reflexes.—Elbow and forearm reflexes, knee-jerks and achilles exaggerated. Tendency to clonus. Considerable atrophy of the muscles of the arm, especially of ulnar muscles and fingers. Marked inco-ordination of hand movements, especially in touching nose. Tremors are increased in these tests. Left hand seems weaker in grasping. No true asterognosis in either hand. Patient's attention difficult to hold. Makes many mistakes, although many things are recognized.

November 20, 1906. To-day patient is somewhat worse, for the most part semi-conscious and very difficult to arouse. There is almost continuous twitching of the hands, feet and face, at times, with lower jaw drooped and lower lip considerably "caved in." Shows some difficulty in speaking. Recognizes physician and is oriented, although when first questioned shows marked confusion and perplexity. The last few days wrinkling of the forehead has been noticed, giving a very perplexed expression, becoming more frequent (omega contraction). Patient has very little to say voluntarily. No stools. Temperature to-day 99.6°, reaching normal in the morning.

November 21, 1906. Patient looks better this morning. Muscular twitching still present. Marked inco-ordination. She is a little brighter mentally and maintains she feels better. However, upon questioning, there seems to be some confusion. Has a good deal of difficulty in pronouncing words

intelligibly. When she becomes agitated over questioning, the face assumes the perplexed expression spoken of before. The patient does not talk voluntarily. Continually moves tongue about in her mouth and tongue takes part in the general muscular twitchings. Right pupil seems a trifle larger than the left.

Q. How do you feel? A. "Well." Q. Where are you now? A. "Danvers" (after much trying to pronounce name). Q. Do you know me? A. "Yes—no, Dr. Cotton." Q. How long have you been here? A. "Two days." Q. How long have you been here? Begins to cry and perplexed expression comes on. Q. Have you any pain? A. "No." Q. Do you feel comfortable? A. "Yes." When asked to shake hands patient takes hand from under the clothes, takes spread to give to physician, moves hands awkwardly about when command is repeated. Says, "I am—I am." Finally grasps physician's hand. In attempting to put finger on her nose shows some inco-ordination, brings finger within one inch of her nose, and holds it there as if she had accomplished the demand. Finally reaches the nose and keeps her hand there with some difficulty, since the twitchings increase very much, even extending to the eyes and all the facial muscles. When asked what she is doing, says, "Nothing," and takes hand down. Able to count fingers at a short distance. Q. Are you afraid of anything? A. "No." Q. Why do you look worried? A. "Oh, I don't know." Asked if she likes to have people talk to her, says, "Yes, I like to have company." *When patient is put on her feet she will collapse unless held.*

November 22, 1906. Patient gradually failing. To-day twitchings more frequent, with all muscles involved except abdominal. Patient is dull, stupid and has great difficulty in grasping questions and answering the same. Tongue twitches almost constantly. At irregular intervals patient's brow contracts and wrinkles, giving the *peculiar perplexed expression*. At these perplexed times, there is no more clouding of consciousness than at other times. Usually in a semi-dreamy state, patient when questioned, shows that she is fairly well oriented as to her surroundings. To-day her speech is hardly intelligible, and she often talks spontaneously in a sort of mutter. Occasionally looks upward at a corner of ceiling and waves hand as if grasping something. This may be a reaction to hallucinations, but the point is difficult to determine. Patient's attention is very difficult to obtain and cannot be held longer than a few minutes. To-day she reacts very sluggishly or not at all to pain stimuli. She scarcely ever winces when pricked. All reflexes much exaggerated. Slight touches bring out knee-jerks, arm and elbow reflexes. No Babinski. Organic reflexes apparently affected. Patient voids urine and feces without knowledge and does not appreciate any untidiness. Temperature, which has been lower the last few days, is higher to-day, reaching 102° in the afternoon. Patient seems much weaker. For three days she has had no diarrhea, apparently as the result of irrigation treatment. Abdomen smaller. Small enemas produced five loose movements during the night.

Electrical Reactions.—Pronounced diminution to Faradic stimulation in all muscles of forearms, hands and lower extremities. Difficult to accurately determine on account of almost continuous twitchings. Twitchings set up by the current and last several seconds afterwards. To galvanism there is also some diminution in all muscles tested, though not as marked as to Faradic. Patient showed to-day great difficulty in swallowing. The food was regurgitated and often choked her when she attempted to swallow. An attempt was made to get patient to try to walk, but she was unable even to stand alone. Absolute loss of co-ordination was shown also in other movements.

Blood Count.—Hemoglobin, 65 per cent; white count, 4840; red count, 3,912,000. Differential white count:

Polymorphonuclear leucocytes		56.5%
Large mononuclear leucocytes	26.0	43.5%
Small mononuclear leucocytes	2.5	
Transitional forms	15.0	

November 23, 1906. At first to-day patient seemed much worse. Made no attempt to answer questions and appeared unable to comprehend questions, or demands. Later, however, she answered a few questions, showing that she knew where she was. Unable to recall name of physician, but gave her own name and the name of the hospital. She took her nourishment better. Twitchings not so marked nor so frequent as yesterday. Perplexed expression not so frequent. Patient failed to sleep during the night, but was quiet and did not talk. To-day reacts somewhat to pin pricks, but is mentally so dull that tests are not accurate. Calls two fingers at first three fingers, later two fingers. A few days ago was able to count fingers fairly correctly. Patient complains of no pain. *Blood culture* sterile. All reflexes markedly exaggerated. Temperature 100.2°.

November 24, 1906. Patient seems a little better and takes nourishment. However, in the afternoon was much weaker and unable to swallow. Patient does not talk spontaneously and now cannot answer questions. Often lips move, but no audible sound is heard. Patient keeps eyes fixed usually in one position, but can follow finger when directed. Evidently hears when spoken to, but fails to understand. Twitchings not so frequent or general as at last note. Perplexed expression much less frequent. Neck stiff and head turned to left. Temperature 100° this p. m. Patient had four loose movements last night, one fairly normal movement to-day. Pulse weak and feeble.

November 25, 1906. Patient shows little change this morning. She had two movements during the night. No mucus or blood. Takes nourishment better. Speech very indistinct and thick. She recognizes those about her and asks for some hot drink. Twitchings of hands, fingers, tongue and lips more marked. Patient smiles, or attempts to smile, when told by physician, even when perplexed. Not apprehensive. This morning neck not so stiff. Patient calls out loudly at times, but what she says is unin-

telligible. She reacts to pin pricks, but in general, pain sense is much blunted and retarded. Occasionally takes hold of physician's hand as if frightened and talks indistinctly and fast. Knee-jerks equal and much exaggerated, and a slight tap produces marked reflex. Clonus in both ankles, but only a half-dozen beats and soon exhausted. Plantars are present and no Babinski.

Electrical reaction still diminished to both faradism and galvanism. Marked inco-ordination.

November 26, 1906. Patient slept little last night. Had frequent spells of fright probably in reaction to hallucinations (visual). She screamed, looked very much frightened and fingered imaginary things with her hands. This episode lasted only a few minutes, then she was quiet again. Night nurse states that patient has had such spells ever since she has been in this semi-conscious condition. Patient has slept little during the last three nights. Twitchings this morning more marked and now, aside from the minor jactitations, patient has developed a much coarser form of twitchings; these are almost convulsive in character and come at the same time as perplexed expression in face. The whole arm and head twitch, but not the feet. She is unable to form any words, but apparently makes the attempt. Continuous twitching of mouth and tongue. Great difficulty in swallowing. Patient has developed a beginning bed sore in spite of all care and attempts to prevent it. Voids her urine and feces frequently and involuntarily. Much rigidity of all the muscles this morning. Patient holds on to the bed clothes. All reflexes much exaggerated as formerly. Reacts very slightly to pin pricks, except on her face. Temperature, 101.4°. Slight ptosis of left eyelid.

November 27, 1906. Patient failing rapidly and now practically unconscious. Pays no attention to external impressions. Breathing rapid, pulse rapid and weak. Makes no attempt to articulate. Does not follow directions. Eyes open and staring. Pays no attention to pin pricks. Reflexes brisk, but there is marked rigidity of all the muscles, which accounts for less exaggeration. Ankle clonus only slight. Plantars normal. No Babinski. Head thrown back. Considerable rigidity of the neck. Twitchings almost continuous and at times stronger than at others. Expression blank, except for occasional furrowing of brow and perplexed expression. Temperature, 101.4°.

November 28, 1906. Patient did not rally after last note. She continued to fail. Almost constant twitchings of the extremities and facial muscles, also tongue and lips. Patient could not talk or form words at all. She died at 10 a. m.

Summary of Clinical History.

Psychosis appearing in a woman of 40, with negative family history and uneventful personal history. Onset of psychosis three years before admission following mental shock caused by husband bringing a strange woman to live at her home. Gradually increasing depression, resulting from

brooding over her wrongs. Vague delusions of persecution. Considerable apprehensiveness, agitation and sleeplessness. Violence towards children and suicidal tendencies. Admitted to Danvers Insane Hospital September 10, 1906.

Here, at first depressed, apprehensive and somewhat agitated. Clear consciousness, orientation and memory perfect. Intellect apparently slightly deteriorated. Sluggish stream of thought and suggestion of psycho-motor retardation. Delusions of persecution and depressive ideas prominent with strong reaction to the same. No insight into her condition.

Physical Examination.—Somewhat anæmic. Otherwise negative. Neurological examination negative.

Soon after admission appearance of general weakness. Became more apprehensive and depressed. One month later developed obstinate diarrhea, loose watery stools and no pain, mucus or blood. Slight rise in temperature. At this time unable to stand and fell on two occasions, once unconscious. Maintained that her legs were unable to hold her. Then one month with improvement of mental condition, but diarrhea resisted all internal medication. November 17 (two months after admission), so weak she was unable to stand. Slight bilateral twitchings, almost constant of arms, hands, fingers, toes and lower jaw. Consciousness somewhat clouded at times. Diarrhea improved and later checked by warm irrigations and nitrate of silver solution. Delirious when left alone, but could be roused by questions. Consciousness at times quite clear. In a few days twitchings were increased, and marked stiffness and rigidity of the muscles appeared with considerable pain when touched. Considerable exaggeration of reflexes and tendency to clonus. Marked atrophy and weakness of muscles of arms and legs. Marked inco-ordination in hand movements and tremor increased by voluntary movements. No astereognosis. Her physical condition became much worse and soon she was unable to speak intelligibly. Lower jaw was dropped and on November 20, occasionally a peculiar wrinkling of the forehead was noticed (omega contraction), showing marked anxiety and perplexity. No voluntary conversation.

Blood Examination.—Hemoglobin, 65 per cent; red, 3,912,000; white, 4840.

Differential Count:

Polymorphonuclear leucocytes		56.5%
Large mononuclear leucocytes	26.0	43.5%
Small mononuclear leucocytes	2.5	
Transitional forms	15.0	

Patient continued in a semi-delirious state, with constant twitchings of the muscles of the extremities, apparently visual hallucinations at times. Marked confusion and anxious perplexity as shown by peculiar "omega contraction" of skin of forehead.

Electrical Reactions.—Pronounced diminution to Faradic stimulation in all muscles of forearms, hands and lower extremities, also some diminution to galvanism. Reaction of degeneration not established. Constant twitchings made tests difficult.

Disturbance of cutaneous sensibilities developed later and marked exaggeration of reflexes and ankle clonus. Temperature chart shows various fluctuations, but temperature was above normal. Towards the last, involuntary passages of urine and feces. Inability to talk and swallow. Anxious, perplexed delirium became more profound and associated with vivid hallucinations and fear with occupation delirium.

Patient rallied a little but finally died November 28 of pulmonary thrombosis, eleven days after the appearance of the twitchings and inco-ordination. The terminal condition may be said to have lasted nearly two months and a half, if we date the onset at time of appearance of weakness with diarrhea and tendency to fall. The diagnosis of "central neuritis" was made on November 17, eleven days before death.

If we follow the course of this terminal condition, the first symptom to appear was a general weakness, then diarrhea, tendency to fall and inability to stand. Later, involuntary twitchings of the muscles of the extremities with atrophy, rigidity and pain on passive movements. The peculiar perplexed delirium occurred with the twitchings and became far more profound with progression of the other symptoms. Then inability to talk and swallow. Later, vivid hallucinations and considerable fright and occupation delirium.

Autopsy Findings.

The autopsy was performed three hours after death by the writers. The protocol is here presented in full on account of the possible interest which all the organs may attain in a case with such widespread lesions of the nervous system.

White female, age 40. Healed ulceration of left lower leg (varicose). Trivial area of sacral decubitus. Excoriations on inner surface of the right knee. Rigor and lividity absent. Abdomen lax. Pupils: left, 6; right, 4.5 mm. Abdominal fat, slight, orange yellow. Thoracic muscles of the usual appearance.

Peritoneal Cavity.—Parietal and visceral serosa normal. Intestinal vessels not injected. Contents of cavity normal. Omentum retracted, contains a little fat. Diaphragm arches to fifth interspace left; fourth rib right. Mesenteric nodes palpable, of a brownish gray tinge.

Pericardial Cavity.—Normal.

Pleural Cavities.—Show no adhesions.

Heart.—Weight, 285 grm. Sub-epicardial fat in considerable amount. Muscle firm, gray red. Faint fibrous mantling of wall of left ventricle near aortic valve. Faint nodular sclerosis of both coronary arteries.

Measurements.—T. V. 10.5, M. V. 9.0, L. V. 1.5, P. V. 6.0, A. V. 6.5, R. V. 0.3.

Lungs.—Left shows slight post-mortem congestion. General edema. Mural thrombus, 2.5 x 1.0 x 0.75 cm., mixed red and gray, granular and friable, attached to wall of branch of pulmonary artery leading to lower lobe (no infarction). Right shows thrombus, 4.0 x 1.0 x 0.75 cm., of similar character to thrombus of left lung, which has produced infarct 10 x 8 x 0.3 cm. deep upon outer surface of lower lobe.

Bronchi.—Normal. Bronchial lymph nodes small.

Spleen.—Weight, 245 grm. Capsule smooth, tense. Substance firm, cuts smoothly. Small hemorrhages 0.2-0.3 cm. in diameter in pulp. Malpighian bodies visible. Trabeculæ normal.

Gastro-intestinal Tract.—Explored throughout, shows no evidence of lesion beyond an occasional small spot of congestion. Contents, liquid, pale.

Liver.—Weight, 1845 grm. Border a trifle blunter. Substance gray red, cuts smoothly, takes thumbnail easily, shows lobulation very indistinctly and contains miliary and submiliary necroses.

Gall Bladder.—Not remarkable.

Pancreas, Adrenals.—Normal.

Kidneys.—Weight, 405 grm. Strip with difficulty from an uneven surface. Cortex not diminished in width. Markings evident. Centers of pyramids show a moderate fibrosis.

Pelves, Ureters, Bladder.—Not remarkable.

Genitalia.—Normal.

Aorta.—Shows nodular sclerosis of thoracic portion.

Organs of Neck.—Not remarkable.

Head, Scalp, Calvarium, Dura Mater.—Normal. Arachnoidal villi moderately developed.

Pia Mater.—Clear.

Brain.—Weight, 1405 grm. Soft and in large part moist. The consistence of the major part suggests the effect of a combined process of encephalomalacia and edema with the edema superficial and largely confined to the vertex. The left hemisphere is a bit firmer than the right. Both poles and the lower surface as far up as the inferior temporal gyri are firmer than the remainder of the brain. The orbital surfaces and the hippocampal gyri show the maximum consistence, the temporal gyri the minimum consistence in the hemispheres. The lower structures, including cerebellum, are softer than usual. Cerebellum, pons and bulb weight 175 grm.

Spinal Cord.—Consistence decreased. The roots are a trifle softer and perhaps moister than normal. No lesion can be observed in the root ganglia or in the Gasserian or abdominal sympathetic ganglia.

Anatomical Diagnosis.

General encephalo, myelo and neuromalacia; superficial edema of the cerebral tissues at the vertex; slight sacral decubitus; unequal pupils; pulmonary thrombosis in both lower lobes (recent); focal necrosis of the

liver; multiple small hemorrhages in spleen; chronic diffuse nephritis of moderate degree; slight coronary arteriosclerosis; nodular sclerosis of thoracic aorta; slight fibrous endocarditis of left ventricle; healed varicose ulceration of the left leg.

Chemistry.

Two portions of brain substance from the frontal pole and the central region of the left hemisphere were examined chemically by Dr. R. L. Emerson.*

Determinations were made of neurokeratin, alcoholic and ethereal extracts and of total phosphoric acid. The frontal portion gave a residue from 10 grm. of 0.17 grm. neurokeratin as against a residue of 0.1 grm. neurokeratin for the central region.

The alcoholic and ethereal extracts gave a residue from 10 grm. of 0.23 grm. for the frontal portion as against 0.31 grm. for the central portion. The frontal sample gave from 11 grm. of 0.16c. figured as P_2O_5 the central sample gave 0.12c. figured as P_2O_5.

Microscopic Findings.

The organs of the trunk and various parts of the nervous system were fixed in Zenker's fluid and stained by the eosin-methylene blue, anilin blue and phosphotungstic acid hematein methods. Various parts of the nervous system were fixed in alcohol and stained by Nissl's method. Similar parts were fixed in formaldehyde and prepared according to Weigert's myelin sheath method and the Marchi method. Preparations were also made according to Cajal's method for fibrils. Frozen sections were stained with Scharlach Roth.

Organs of the Trunk.—The examination of the organs of the trunk served in the main to confirm the gross diagnosis. The heart showed a minor degree of intimal sclerosis of small branches of the coronary arteries. A section from the left ventricle showed a considerable degree of interfascicular fibrosis, as well as several foci in which muscle fibers had been diminished in diameter or totally destroyed. A section from the right ventricle showed far less interfascicular fibrosis and no foci of muscular atrophy. It was also worthy of note that the right ventricle showed far less perinuclear pigmentation of the fibers constituting its walls than did the left ventricle.

Lungs.—Showed in the alveoli considerable number of pigmented phagocytic cells. The thrombus of a pulmonary branch described in the gross, however, had led to no infarction. Microscopic examination by several methods of the pulmonary arteries, showed an extensive sclerosis with deposit of lime salts, which recalls conditions found, as a rule, in the greater circulation. The zone of adhesion between the thrombus and the

* Under a grant from the Proctor fund.

sclerotic wall showed very numerous pigmented cells imbedded in granulation tissue. The bronchi were normal.

Spleen.—Showed throughout the pulp numerous small hemorrhages of a recent character. A number of phagocytic cells can be demonstrated in various parts of the pulp, but phagocytosis cannot be said to be markedly active. There is an increase of fibrous tissue in the pulp. The Malpighian bodies are very generally dotted with mononuclear phagocytic cells which are actively digesting cells of the lymphocytic type. Most of the cells of the Malpighian bodies are small, of even diameter and provided with nuclei approaching the solid type. The Malpighian arterioles show a moderate amount of hyaline change.

Lymph Nodes.—From several sources show a moderate number of large mononuclear cells in the sinuses, but the sinuses themselves are not especially dilated. The cells of the lymphoid tissues of the lymph nodes present a certain difference from those of the Malpighian nodules of the spleen in that the nuclei of the lymphocytes in the lymph node, are rather more vesicular than those of the Malpighian lymphocytes. Moreover, there is a considerable tendency to the occurrence of cells resembling the plasma cells. There is nowhere any appearance suggesting invasion of perilymph-node tissue.

Bone Marrow of Right Femur.—The marrow is more cellular than usual. The capillaries are dilated with blood corpuscles. The cells of the tissue spaces are predominantly mononuclear. The mononuclear cells, as a rule, show large vesicular nuclei. The cytoplasm assumes a variety of shades both blue and red. A number of the nuclei of the mononuclear cells show indentation, with an occasional transition toward the polynuclear form. There is a certain number of cells with pyknotic nuclei about which it is impossible to say whether they are ill-preserved or degenerate. Cells of a frankly polynuclear type occur in about the proportion of one to ten of the mononuclear forms, although there are small foci in which polynuclear leucocytes are more frequent. Cells with large eosinophile granules are comparatively infrequent. They occur in about the proportion of one to twenty-five or more of the mononuclear forms. Many fields may be searched without results for eosinophile cells. The eosinophile cells are apt to be mononuclear or somewhat indented. The giant cells of the marrow are fairly frequent. They present the usual picture of multiple vesicular nuclei pulled out into various amœboid shapes. The cell bodies are rarely provided with prolongations.

Liver.—Microscopic findings confirm the gross diagnosis.

Adrenal.—Not remarkable.

Kidney.—Confirm gross diagnosis.

Intestinal Tract.—Several foci of the intestine showed intensely congested capillaries. These foci are minute and fail to be related with especially marked changes in nerve cells. The most important change found in the intestine, at least from the present point of view consisted in changes of two types found in the nerve cells of Auerbach's plexus. These changes

recall, on the one hand, the edema change as found frequently in the large nerve cells of the central nerve system, and, on the other hand, the axonal reaction of Nissl as found in the central nerve system upon section of the corresponding nerve fibers. We are unable to say definitely what relation these changes bore or could bear to the diarrhea. The second type of change, namely, that which resembles the axonal reaction of the central nervous system, may well be a sign that the lytic agent which has affected the nerve cells of the brain, spinal cord and dorsal root ganglia, has also taken effect in the sympathetic system. If so, this intestinal nerve cell change must be regarded as one of our best evidences that the condition with which we are dealing is a condition of general neuritis and not merely one of central neuritis.

The majority of cells show a reaction resembling the axonal reaction; that is to say, the cell body is rounded; the nucleus is pyknotic, somewhat shrunken and eccentric; and the contents of the cell body are homogeneous. (See Fig. 3, illustrating a change regarded as due to simple edema, and Fig. 4, showing the characteristic change in nerve cells of Auerbach's plexus.)

Numerous mitoses are found in the epithelium in various parts of the small intestine. It might be an attractive hypothesis to relate these mitoses of the epithelium in some ways to the nerve cell changes in the sympathetic system. There are not data enough by which to support this hypothesis.

Central Nervous System.—The examination of the central nervous system, like that of the organs of the trunk, serve, in the main, to confirm the gross diagnosis. We shall limit our description to points which we regard as related to the condition in hand. We relied upon the Nissl method in its original form for detection of the axonal reactions which the clinical symptoms had led us to expect. We examined numerous areas from both sides of the cerebrum, from several regions in both cerebellar hemispheres, and from three levels of the spinal cord by the Nissl method. Co-ordinately with these areas we examined adjacent blocks by the eosin and methylene blue, the anilin blue and the phosphotungstic acid hematein methods after Zenker fixation, as well as adjacent blocks fixed in formalin by the Marchi method for fat and the Weigert method for myelin sheaths. A certain number of sections were stained by the Bielschowsky and Cajal methods, as well as by the Scharlach R. method.

The essential changes of this disease are probably demonstrable by a combination of the results of the Nissl method with those of the Marchi method. Of course, the number of axonal reactions will in most cases fall short of the number of fatty fibers. This disparity in the results of the two methods is without doubt due to the fact that the Marchi mehod is better capable of demonstrating the changes than is the Nissl method. For the small cells fail to show characteristic axonal reactions under any circumstances.

The most difficult point to determine in such cases is how far post-mortem or agonal alterations are responsible for confusion in the gross diagnosis. Changes of the sort which we must regard as related either with edema or with post-mortem lysis were found in various places, but particularly in sections from the two superior frontal gyri and from the two gyri recti.

Far more common are the axonal reactions. These abounded in all regions in the large cells. The calcarine and hippocampal regions may be mentioned as especially rich therein. An increase of satellite cells with occasional apparent total replacement of nerve cells with cells of the satellite type was found particularly in sections from the two superior frontal gyri.

The white matter in most regions shows a moderate amount of green pigmentation in phagocytic cells of the perivascular sheaths. This pigmentation was slightly more prominent in the motor areas, and could be found in very few vessels of the gyri recti.

A certain disparity in the cell proportions was noted on the two sides of the cerebrum in the motor area. As these changes seem to bear no relation to the disease in question, we shall postpone their consideration to another context. Of importance in the present connection seems to be the fact that the nerve cells show relatively the same proportion of axonal reaction on the two sides.

The Marchi reactions of the various areas are of note in that they suggest certain differences in the severity of the fatty degeneration in various parts. Thus, we have noticed that the superior frontal gyri, the right calcarine and right hippocampal gyri show slight Marchi changes. The right gyrus rectus appears to show considerable more fatty degeneration than does the left. The left leg area shows extensive changes; but these are less marked than those of the right leg. We have noted that the left hippocampal gyrus and the right leg area show the maximal changes found in this case. It seems impossible to correlate these variations with known characters of the lytic process. It must be remembered that except in marked instances the fiber methods for fatty degeneration are for technical reasons more qualitative than quantitative. It is difficult to control the thickness of sections and the degree of penetrability of the osmic acid-Muller mixture.

We have stated above the number of cells showing the axonal reaction will fall short of the number of fatty fibers. This is true if the Nissl method alone is used to demonstrate the changes in the nerve cells. However, the sections stained by the Scharlach R. method, which is fairly accurate for showing fatty pigmentation of the cells, or better, fatty degeneration, exhibits many nerve cells affected, and usually these are smaller cells, which show apparently little or no change by the Nissl method. Hence, there is little disparity between the proportion of degenerated fibers and affected cells. In some respects the Marchi method for fat and the Scharlach method show similar pictures; but fatty pigmentation is demonstrated better in the cells by the latter method, which

method does not stain the degenerated myelin sheaths so well. By the Scharlach method the tissue is hardened in formaline, and does not go through solutions that tend to extract the fat, and for that reason a more accurate picture can be obtained. In the large Betz cells of the motor area, both methods will demonstrate the fatty degeneration. In cells slightly affected, as in Fig. 2, the fatty pigmentation seems to surround the chromatolyzed area, and while in cells where the process of degeneration is further advanced, the whole of the chromatolyzed area is filled with fat. In the smaller cells, however, a great many show a well-advanced type of degeneration; the whole cell is filled with fat, and in some instances the axis cylinder shows the same picture, while a small amount of fatty pigment may be considered normal in cells at certain periods of life, when it is present in the amount shown here, we can well believe that it is pathological.

This process is distributed unevenly throughout the cortex, some areas showing a large majority of cells so affected, while in other regions the process is less marked. Cells in the same section will also show the same variation.

Cells stained by the method of Cajal and Bielshowsky for neurofibrils were not altogether satisfactory, but in a few instances a definite change in the fibrils within the chromatolyzed area were observed.

Spinal Cord.—The great majority of large cells show characteristic axonal reactions by the Nissl method. The Marchi method showing scattered degeneration in all parts.

Cerebellum.—The cerebellum shows few changes by the Nissl method which could be related to a lytic process. Nevertheless, a few Purkinje cells show an approximation to the axonal reaction with, however, a preservation of Nissl bodies. The Marchi reaction shows marked fatty degeneration of a scattered type in the white matter. It seems difficult to deny that some of the fibers related with Purkinje cells must have undergone fatty changes. Further study seems desirable to discover what peculiarity permits the Purkinje cells to resist to all appearances the lytic process.

Peripheral Nervous System.—The nerve roots and nerves examined show a general fatty degeneration of a moderate scattered type. The nerve roots opposite their origin at the spinal cord show the same degree of change which is shown by the adjacent fibers of the cord itself. The root ganglia exhibit a majority of cells which are either quite normal or slightly pigmented. A certain number, however, of the root ganglion cells show axonal reactions of an exquisite and wholly characteristic type. Enumeration shows that about one in fifteen of these cells shows the axonal reaction. The reacting cells occur in small groups as a rule.

Bacteriology.

Blood culture one week before death proved sterile.

Culture from the ***heart's blood at autopsy*** was sterile. The *cerebrospinal*

fluid contained *Bacillus coli communis*. A few staphylococcus colonies grew from a plate taken from the left inferior frontal convolution.[1]

Summary and Conclusions.

The present case is a fresh example of Adolf Meyer's central neuritis and shows, as did some of Meyer's cases, an involvement of the peripheral and sympathetic nervous system, together with the central nervous system, in a condition of severe and extensive lytic change. These lytic changes are exhibited in characteristic Marchi degenerations of the medullated fibers and in the axonal reaction of Nissl in certain nerve cell types.

These fiber and cell changes are, it is probable, only the evident fraction of a large series of changes of a lytic nature, most of which cannot be demonstrated by present histological methods. Thus the Marchi degenerations invariably surpass in amount the axonal reactions, doubtless because many of the fibers which show fat drops are connected with cells that are too small or too scantily supplied with Nissl bodies to exhibit the axonal reaction of Nissl. As shown by the Scharlach method the small cells have undergone a serious form of degeneration and are filled with fatty pigment.

Another evidence of the universality of these changes is the characteristic reduction of consistence on the part of both the encephalon and the cord. Attention has been called to this alteration of consistence by Southard and Hodgkins. In the case reported by them, the reduction was striking in all parts except an area of sclerosis in one hemisphere. Examination of the tissues by the Marchi and Nissl methods showed that the preserved nerve cells and fibers in the sclerotic area exhibited the same changes as the cells and fibers elsewhere. The disease, therefore, seemed due to some lytic agent differential for nerve elements, possibly an autolytic agent. The present case again illustrates the generalized reduction of consistence of central nerve tissues (general encephalomalacia and myelomalacia), together with some indication of the process in the peripheral elements, the result, perhaps, of a lysis or autolysis yet more general (neuromalacia).

[1] We are obliged to Dr. F. P. Gay, bacteriologist to the Danvers Insane Hospital, for these findings and several suggestions.

The question may well arise whether the cells or the fibers are the first to be involved in the lysis. Despite the extent and severity of the Marchi degenerations in the medullated fibers, it is nevertheless probable that the lysis primarily affects the nervous elements rather than the myelin investments. This point is borne out by the extensive changes, simulating the axonal reaction, in the nerve cells of Auerbach's plexus in the present case. Reasoning from this finding to the interpretation of central nervous findings, it seems possible to argue that the hypothetical lytic agent attacks elements largely proteid in character. The Cajal fibril preparations, so far as decisive, are consistent with this hypothesis. The nerve cells, stained with Scharlach Roth, show no accumulations of fat within the central or chromatolyzed area in the first stages of degeneration, but later as degeneration proceeds, the whole cell is filled with fatty pigment.

When such cytolytic changes prove to be so extensive as in the present case, involving various groups of axis-cylinders and eventually various nerve cell bodies and nuclei, as well as myelin sheaths in many regions, it may well be that the change here particularized is only an expression of a still more general lysis or autolysis which will be best attacked along chemical lines.

DESCRIPTION OF PLATES.

FIG. 1.—Betz cell from motor cortex (after Adolf Meyer), showing typical axonal reaction by Nissl method. Note the dislocation of the nucleus, and homogeneous degeneration of center of cell and of part of the apical process; Nissl bodies almost entirely destroyed. From a case of central neuritis, reported by Dr. Meyer, and reproduced by his kind permission.

FIG. 2.—Betz cell from motor cortex, showing axonal reaction, stained with Scharlach R., and counterstained by hematoxylin. Fat stained red, and surrounds chromatolyzed area. As degeneration advances, the fatty substance encroaches on center of the area until finally it fills the entire cell.

FIG. 3.—Similar cell stained with osmic acid and counterstained with saffronin. Fatty pigment stained black. The central portion shows no fat.

FIGS. 1, 2, 3, drawn with No. 4 ocular and 1/12 oil immersion.

FIG. 4.—Photomicrograph of the nerve cell characteristically found in Auerbach's plexus in our case of central neuritis. ×1000. The cell body is almost homogeneous and stains moderately deeply. The nucleus is shrunken pyknotic and eccentrically set. The adjacent non-nervous cells and the tissue at large exhibit no striking alterations, and fail to suggest general lysis. The appearances in the nerve cell suggest those found in central nerve cells when the axones have been cut or otherwise destroyed (the axonal reaction of Nissl).

FIG. 5.—Photomicrograph of nerve cell from Auerbach's plexus. ×1000. To illustrate the effect of *simple edema*. The central oval space is partially filled with a large nerve cell with ragged edges and a vague spongy cell-body. Note that the nucleus is vesicular and preserves a central position. There is a somewhat wide light zone about the nucleus, recalling the appearances described by Hoch for edematous cells of the central nervous system.

We are indebted to Mrs. Henry A. Cotton for the drawings of Figs. 2 and 3.

FIG. 1.

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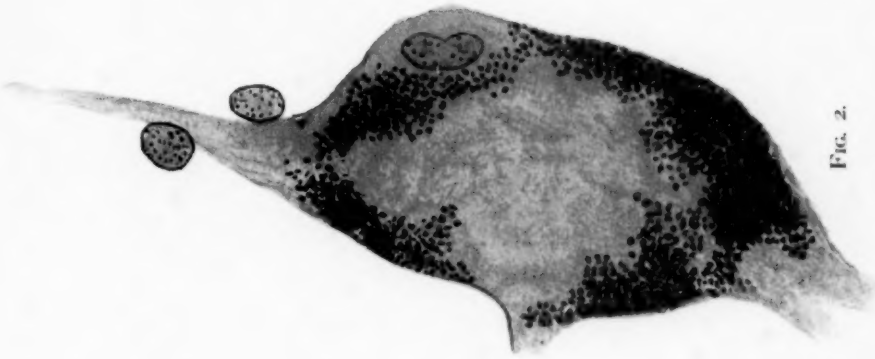

Fig. 2.

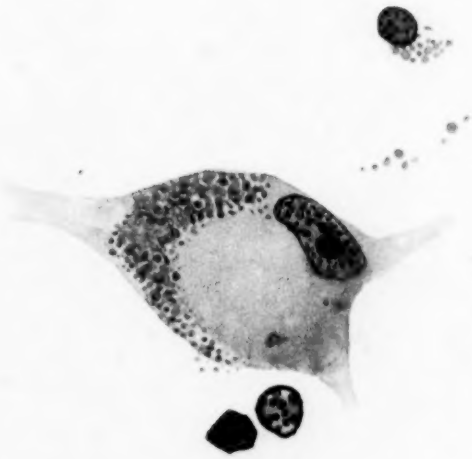

Fig. 3.

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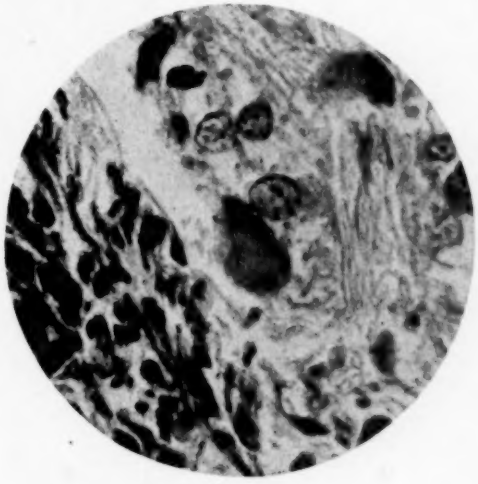

FIG. 4.

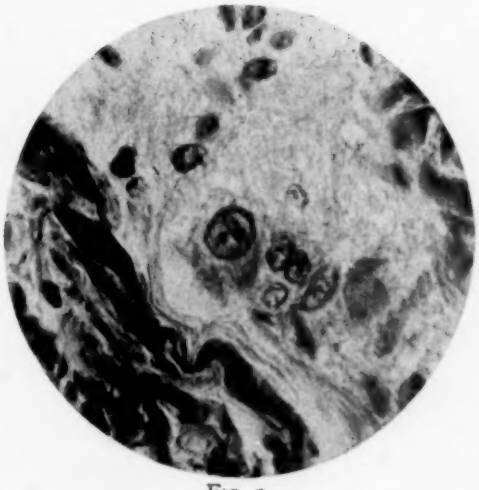

FIG. 5.

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MARY

A REVIEW OF OUR PRESENT KNOWLEDGE CONCERNING THE SERO-DIAGNOSIS OF GENERAL PARALYSIS.

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As the subject of sero-diagnosis is one which in general is alien to the field studied by the psychiatrist, in presenting a critical review of its application to the diagnosis of mental disease it will be desirable briefly to consider some of the more elementary of the principles on which it is based. Of the various new methods that may be grouped under the designation of sero-diagnostic tests the one known as Wassermann's reaction is by far the most important, so that it will have to be considered at greatest length. The essence of Wassermann's discovery can be shortly stated: The blood serum of a syphilitic, when mixed with an infusion made from syphilitic material, has the power of binding the "complement" of normal blood serum. To appreciate the significance of this observation it is necessary to recall the following facts concerning the nature of "complement."

If living material, *e. g.*, red blood cells, bacteria, serum albumin, etc., is injected into an animal, the blood plasma of this animal acquires the property of reacting *in vitro* to corresponding material (which is called "antigen") in certain definite ways. For instance, if red blood cells constitute the antigen then the blood serum of the animal into which they have been injected will acquire the capacity of dissolving such cells when added to them in a test tube, in other words, of bringing about hæmolysis. If the antigen is one which, like red blood cells, is obtained from an animal, then the injection must be into an animal of a different species from the first. The serum becomes "inactivated," that is to say it loses this newly-acquired capacity, on being heated for half an hour at 56° C. This inactive serum, however, essentially differs from that of a normal animal, for if a small portion of

normal serum, which has no power of dissolving red blood cells, is added to it, then hæmolysis again takes place as before. The normal serum itself loses this power of "reactivating" the inactivated serum if it is previously heated to 56° C. From these and other facts it becomes evident that two substances are concerned in the process of hæmolysis, (1) a body, which loses its potency on being heated, present in normal serum, and (2) a body, unaffected by heat, present only in immune serum. The former, which is called "complement," is a non-specific substance; the latter, which is called "amboceptor," "anti-body" or "immune body," is a specific substance, being operative only in regard to the antigen by the injection of which it was evoked. These facts were first established by Bordet and Gengou in 1901,[1] and were independently elaborated four years later by Moreschi,[2] and Neisser and Sachs.[3]

The non-specificity of the complement of blood serum is a fact utilized for a number of different purposes. As the same complement has the power of acting on either red blood cells or bacteria, provided the requisite specific anti-body is present in each case, the question whether one of these processes has taken place can be decided by finding out if the other process will subsequently take place when the same serum is used, for the complement can act in either but not in both of these processes. In other words, if the complement has been fixed by being combined with one substance or set of substances it will no longer be free to play its part in any subsequent process. To take an example: If complement-containing blood serum is added to a bacterial emulsion (antigen) and the corresponding anti-body (bactericidal serum) then it will enter into union with these two elements, and will not be available for any subsequent combination. If the elements in question consist of red blood cells (antigen) and hæmolytic serum (anti-body) then the presence or absence of available complement

[1] Bordet and Gengou: Sur l'existence des substances sensibilisatrices dans la plupart des sérums antimicrobiens. Annal. de l'Instit. Pasteur. 1901. T. XV. P. 289.

[2] Moreschi: Zur Lehre von den Antikomplementen. Berl. klin. Woch. 1905. Nr. 37. S. 1181.

[3] Neisser and Sachs: Ein Verfahren zum forensischen Nachweis der Herkunft des Blutes. Berl. klin. Woch. 1905. Nr. 44. S. 1388.

in any serum that is added can be determined at a glance by noting whether hæmolysis, or laking, has taken place or not. If it has, then the complement necessary for this process must have been available; if not, no available complement could have been present. We can in this case easily tell whether the serum being tested contained any available complement or not. On the other hand many analogous processes are not so easily observed in their operation, and it may be impossible to know whether combination has taken place except by the application of some further test. This is often so in the case of micro-organisms, and then the question whether the elements have combined or not can be answered by the method just indicated; namely, by noting whether or not there is still any free complement available for a further reaction. For instance, when a complement-containing serum is added to what are presumably antigen (*e. g.*, bacterial emulsion) and anti-body (bactericidal serum), then if the three elements have combined there will no longer be any free complement; this is easily tested by seeing whether the mixture will bring about hæmolysis when added to an emulsion of red blood cells and their corresponding hæmolysin.

It will be seen that if two of the three elements are known to be present in a given solution and combination occurs, as determined by the fixation of the complement so that it is no longer free to participate in the subsequent hæmolysis test, then it follows that the third element must also have been present. We have, therefore, by this method a means of testing for the existence of any one of the three elements. If, for instance, a bacterial emulsion in the presence of a given fluid so reacts with normal blood serum that the complement of the latter becomes combined, and is no longer free to bring about hæmolysis when red blood cells and hæmolytic anti-body are subsequently added, then it may legitimately be inferred that the fluid in question must have contained a specific anti-body to the bacterium employed. That is precisely what Wassermann observed in the test now under discussion. He mixed syphilitic material (from the liver of a fœtus in which spirochætes were abundant) with the blood serum of the patient, and found that the mixture had the property of binding the complement present in normal serum so that this could no longer dis-

solve red blood cells in the presence of their specific anti-body. He at once concluded that he had to do in the patient's serum with a specific anti-body to syphilis, produced by previous infection, and that here was a method of ascertaining if a given patient had or had not been infected with syphilis. That the question is, however, by no means so simple as Wassermann at first supposed will be made evident by considerations presently to be adduced. We shall discuss first the clinical significance of the observation, and then the nature and pathological interpretation of the phenomenon.

The technique of the procedure is fully described by Meier (96), Taege (145), and Maslakowetz and Liebermann (94), and may shortly be described as follows. An emulsion is made of the syphilitic liver of a fœtus, and 0.2 ccm. of it is added to an equal quantity of blood serum of the patient to be tested, together with 0.1 cm. of the blood serum of a normal guinea-pig. The mixture is incubated for one or two hours at 37° C. A 5% emulsion of sheep's red blood corpuscles in normal saline is then taken; these must be thoroughly washed with saline in order to remove any complement-containing serum that would accompany it. To 1 ccm. of this emulsion is added twice the amount necessary to dissolve it of the serum of a rabbit which has a week previously been injected on more than one occasion with sheep's corpuscles, and which therefore will contain a specific hæmolytic anti-body, and then the above-mentioned mixture. If the reaction is negative then hæmolysis, not being inhibited, occurs within half an hour, though this may be delayed for two hours; if it is positive then hæmolysis does not occur. Only complete inhibition of hæmolysis is to be regarded as significant, a point much emphasized by Elias, Neubauer, Porges and Salomon (30). Valuable methods of standardizing the materials employed, and so of estimating the intensity of the reaction, have recently been introduced by Bruck and Stern (15) and Noguchi (112). A promising, but yet unconfirmed, simplification in technique has recently been introduced by Maslakowetz and Liebermann (95). They use fresh pig serum instead of immunized rabbit's serum, as pig serum in the natural state has the power of dissolving sheep's corpuscles; this device obviates the necessity for previously immunizing rabbits.

Since one has to work with five different substances the opportunities for errors of technique are numerous, and this no doubt accounts for many of the contradictory results that have been recorded by some observers. It is absolutely essential that every observation be simultaneously controlled. Especially is it necessary to test the efficacy of the hæmolytic serum obtained from the rabbit, and whether the patient's serum itself contains any hæmolysis—inhibiting substance, a by no means unusual occurrence. Thus a number of possible sources of error must first be eliminated before one is justified in concluding that the inhibition of hæmolysis is due to fixing of the complement by the combination of syphilitic antigen and the supposed anti-body in the patient's serum. It is this fact which at present restrains the introduction of the method into general use, except where there is a suitable laboratory with workers who are accustomed to deal with immunity problems.

With regard to the actual results obtained there is a striking general agreement amongst various workers; discordance prevails chiefly concerning matters of interpretation. It would be impossible to quote the individual figures published by the different workers, for at the present time they have become too unwieldy in extent, in that they refer to several thousand cases that have been examined. Amongst the more extensive series are 500 cases published by Blaschko (10), 400 by Raviart, Breton and Petit (127), 354 by Neisser, Bruck and Schucht (109), 231 by Citron (17 and 19), 222 by Gross and Volk (53), 202 by Meier (96), 190 by Eichelberg (27), 180 by Plaut (122), 169 by Maslakowetz and Liebermann (95), 150 by Nonne (33), 114 by Fischer and Meier (36), 111 by Stertz (143), 107 by Hiller (54), 100 by Kafka (59), 100 by Schütze (140), and 80 by Mühsam (105). The conclusions that emerge from consideration of the various statistics are on several points very definite. We must clearly distinguish the results obtained from examination of the blood serum from those obtained from examination of the cerebro-spinal fiuid.

It may be said with no reserve that in the blood serum the reaction is positive in the large majority, from 80%-90%, of all individuals who have been infected with syphilis. The frequency with which the reaction is obtained naturally varies with the stage

of the malady. The figures given in this connection by Fleischmann (38) agree with the results of other workers, notably Hoffmann and Blumenthal (55), Blaschko (10), Citron (19), and Fischer and Meier (36), and are as follows: 100% in primary syphilis, 93% in the florid secondary stage, 64% in the latent secondary stage, 98% in cases with tertiary manifestations, 42% in latent tertiary cases, and 81% in cases of tertiary disease of the nervous system. Thus in cases of active syphilis the frequency with which a positive Wassermann reaction is obtained is exceedingly great. Similar results are to be obtained with the secretions of syphilitics. Thus Blumenthal and Wile (13) examined the urine of 41 cases of syphilis, and found a positive reaction in 31 instances; 34 of the cases gave a positive reaction with the blood serum. Gross and Volk (53) repeatedly obtained a positive reaction with the milk of mothers suffering from syphilis. Fränkel and Much (49) obtained a positive reaction from the blood taken after death in six cases of Heller's aortitis, though the reaction was negative in several cases that were supposed to be of a syphilitic nature; the method thus opens out interesting possibilities in the field of morbid anatomy.

On the negative side the results are similarly remarkable. Almost all observers have published a large number of control cases in their series, and, with few exceptions, have obtained negative results in non-syphilitic cases. Kurt Meyer (97), indeed, goes so far as to state that up to the present out of several thousand cases not a single authenticated instance of a positive Wassermann reaction in a case in which syphilis can be excluded has been published. This is of course a safe statement to make, having regard to the difficulty of ever excluding syphilis and the numerous sources of fallacy in that connection. He makes a possible exception, however, in the case of certain diseases that ætiologically stand in a near relation to syphilis, referring in this relation to the case of frambœsia in which Blumenthal (11) obtained a positive reaction, and to the frequency with which the reaction may be obtained with the blood serum of normal rabbits, a fact that Blumenthal (12) attributes to coccidial infection. Eichelberg (27) and Landsteiner, Müller and Pötzl (71) say that the reaction is also sometimes positive in sleeping-sickness,

in rabbits infected with dourine, and in dogs affected with piroplasma, maladies all notoriously closely akin to syphilis. On the other hand Weil and Braun (160) state that they have occasionally obtained positive reaction in severe cases of pneumonia, typhoid, tuberculosis and diabetes, diseases with extensive cell disintegration; the theoretic interest of this matter we shall again refer to. They also (159) obtained it in 8 out of 17 cases of malignant disease. Further Jundell, Almkvist and Sandmann (58) obtained a positive reaction in 4 out of 26 cases of leprosy. In regard to scarlet fever, which, like syphilis, is presumably a protozoal infection, the results are discordant. Eichelberg (27) found the serum positive in 10 out of 45 cases, Fränkel (48) in 5 out of 12, and Much (102), working with Fränkel, has also obtained positive results. Jochmann and Töpfer (57) on the contrary found the serum constantly negative in 33 cases they examined, and Sachs (131) also failed to obtain any positive reaction.

In cases of metasyphilis of the nervous system, particularly in cases of general paralysis, the frequency of a positive Wassermann reaction in the blood is still higher. Plaut (122), for instance, who is one of the most careful and experienced workers in the field, has found a positive reaction in the blood in every single instance of the 180 cases of general paralysis he has examined; Lesser (76) found no exception in the 37 cases of general paralysis he examined with Michaelis, and several other writers give similar results.

Coming now to the subject of the cerebro-spinal fluid, we find results of equal importance, especially from the point of view of psychiatry. Without quoting wearisome, and on the whole uniformly significant, statistics, we can at once state that the cerebro-spinal fluid of cases of metasyphilis of the nervous system, notably of general paralysis, gives a positive Wassermann reaction in about 90% of all cases. This may now be regarded as definitely established, as it is based on extensive examinations, such as Plaut's (122) series of 180 cases of general paralysis. The value of this fact in diagnosis is heightened, not only by the non-occurrence of the Wassermann reaction with the cerebro-spinal fluid of non-syphilitic cases, but still more by the comparative infrequency

of its occurrence even in cases of tertiary syphilitic disease of the nervous system. If the nervous affection is syphilitic, but not parasyphilitic, then the cerebro-spinal fluid gives a positive reaction in only about 10% of the cases.

Attempts have been made to correlate the occurrence of the Wassermann reaction with other points in the case, with not very conspicuous success. Marie and Levaditi (86), for example, maintained that the reaction was less likely to occur in the early stages of general paralysis, and that it became more pronounced in intensity as the case progressed. Plaut (120), basing his opinion on a much more extended experience, has negatived this, however, and finds a positive reaction as often in the early stages of the disease as in the late. Further, according to Plaut (121) and Kafka (59), there is no increase in the intensity of the reaction after exacerbations and seizures, as Marie and Levaditi (86) had asserted. Lesser (76) maintains that the administration of mercury has an effect on the reaction, often converting a positive into a negative one. On the contrary Fischer and Meier (36) observed cases in which the intensity of the reaction increased during the progress of mercury treatment. A similar discordance of opinion prevails in regard to the influence of previous treatment. Wassermann (33), Citron (17, 18 and 19), Fleischmann (37 and 38), Schütze (140) and Butler (16) hold that a positive reaction is less likely to occur, or is less pronounced if it does occur, in cases which have previously been submitted to mercury treatment, and that this likelihood can be correlated with the thoroughness of the treatment. It is suggested that the reaction be utilized for the purpose of testing the effectiveness of the treatment. On the other hand Schuster (137), who in general is a disbeliever in the prophylactic value of mercury,[4] Frenkel (50), Maslakowetz and Liebermann (95) and Meier (96) are unable to trace any such correlation.

It seems established that the presence of a positive reaction, and its intensity, stand in no relation to the extent of the cell count in the cerebro-spinal fluid. Marie (85), Levaditi, Ravaut and Yama-

[4] Schuster: Hat die Hg-Behandlung der Syphilis Einfluss auf das Zustandekommen metasyphilitischer Nervenkrankheiten? Deutsche med. Woch. Dez. 12, 1907. S. 2083.

nouchi (80), Plaut (121) and Kafka (59) all emphasize the fact that a high cell count may coexist with a negative Wassermann reaction, and a low count with a markedly positive reaction. Marie (85) and Levaditi, Ravaut and Yamanouchi (80), however, maintain that there is a close correlation between the Wassermann reaction and the proteid increase in the cerebro-spinal fluid. Noguchi (112) is unable to trace any such correlation and has recorded cases in which the Wassermann reaction was strongly positive while the proteid content was low. It is evident that great caution should be exercised in making any such generalizations, which should be based only on an extensive and adequate series of observations. It is certainly premature, for instance, to attempt, as Marie and Levaditi (86) have done to connect the existence of the Wassermann reaction with various features in the mental aspects of the malady.

The very great value of the reaction in the diagnosis of general paralysis is enthusiastically maintained by almost all workers on the subject. Most are further agreed that examination of the cerebro-spinal fluid is of much greater value for the purpose than examination of the blood serum; Marie, Levaditi and Yamanouchi (93), Plaut (121) and Kafka (59) speak unequivocably to this effect. In truth it would seem that in this matter one should discriminate between the value of a positive and a negative finding. A positive finding in the blood is evidently open to many interpretations, as Kafka (59) insists; a negative finding there, however, if all adequate precautions have been taken, would speak strongly against the diagnosis of general paralysis, as the blood in this malady practically always gives a positive reaction. On the other hand a positive reaction with the cerebro-spinal fluid is of very great value in the diagnosis of general paralysis, as it is so rare in any other affection, even in lues of the nervoue system; whereas, a negative finding in the cerebro-spinal fluid by no means excludes general paralysis, as Lesser (76) would maintain, for the reaction in the fluid may undoubtedly be sometimes negative in general paralysis. It is evident that in all doubtful cases both the cerebro-spinal fluid and the blood serum should be examined.

The interest of the reaction for psychiatry is not exhausted with the diagnosis of general paralysis. In cases of lues of the ner-

vous system examination of the fluid and blood is of great value in either a positive or negative direction. Particularly interesting results have been obtained, notably by Plaut (122) and Raviart, Breton and Petit (127), in the case of idiocy due to congenital lues; they maintain that this causative factor is of considerably greater frequency in this connection than has been supposed.

To sum up the clinical significance of the reaction in psychiatry.—A positive reaction in the cerebro-spinal fluid is strongly indicative of general paralysis, a negative reaction less strongly, but unquestionably, indicative of its absence; a positive reaction in the blood serum of a suspected case of general paralysis is of some value in support of the diagnosis, a negative reaction there is of much greater value in excluding such a diagnosis. Further, examination of the blood is of great value in cases of suspected tertiary lues of the nervous system.

We now approach far more debatable questions in connection with the interpretation of the above observations. As was mentioned above the explanation given by Wassermann was that the substance in the patient's serum was a specific syphilitic anti-body which had been evoked by the previous syphilitic infection. With Neisser and Bruck (150 and 151) he supported this conclusion by the following arguments: (1) The reaction was positive only when syphilitic material was used, not when extracts of normal organs took the place of the syphilitic material as an antigen. (2) The reaction was negative in the case of normal monkey's serum, but positive with the serum of monkeys who had previously been inoculated with syphilis. (3) If, when monkeys were inoculated with any other human material than syphilitic, their serum reacted neither to normal organ extract nor to the extract from a syphilitic organ; this observation excluded the chance of the anti-body in the monkey's serum having been formed in response to the inoculation with albuminous material, although this would have been an unlikely occurrence in that such formation of anti-body to albumin does not occur between closely related species.

A disconcerting note was, however, early struck by the discovery by Marie and Levaditi (86) that the reaction could be ob-

tained not only with the extract of a syphilitic liver but with that of a normal liver. This observation was quickly confirmed by Weil and Braun (155), Kraus (67), Michaelis (98), Fleischmann (39) and others. Further it was found that the extracts of other material could also replace the syphilitic liver as so-called antigen. Thus Pappenheim (114) obtained the reaction with an emulsion of white blood corpuscles instead of the syphilitic liver, Weygandt (161) obtained it with an emulsion of normal spleen, Levaditi and Yamanouchi (83) with red corpuscles, white blood corpuscles or brain emulsion, Gross and Volk (53) with an emulsion of the heart and other organs, Weil (154) with the extract made from sarcoma, and Kraus (67), Landsteiner, Müller and Pötzl (72) with the extracts from several organs of the body. Müller (106) obtained the reaction with the heart and other organs of the guinea-pig. Again not only can living material of various sorts serve as antigen, but also different chemical substances, a fact that begins to give a clue to the intimate constitution of the active agent. Fleischmann (39) showed that lecithin and cholesterin could replace the syphilitic liver used by Wassermann. Fritz and Kren (51) and Porges and Meier (126) also obtained the reaction with the use of lecithin, Sachs and Altmann (133) with sodium oleate, Levaditi and Yamanouchi (81 and 83) with lecithin, protagon, choline, sodium taurocholate or sodium glycocholate, Eichelberg (27) with lecithin, bile salts or salts of oleic acid, and Nobl and Arzt (111) with sodium oleate or sodium glycocholate. Noguchi (112) finds that the bile salts are less active than lecithin and agrees with Levaditi and Yamanouchi (81) that cholesterin is inactive.

The objection raised by Citron that these results were due to errors in technique was readily disproved, and it soon became evident that the active substance in the blood serum had the property of combining with a large number of various bodies to fix complement, and that it was not a question of a specific relation to a syphilitic antigen. At the same time it is generally admitted that a more pronounced reaction and better practical results are obtained when a syphilitic liver is used, as was originally and is still recommended by Wassermann; Frenkel (50) lays great stress on this point. This made it probable that the syphilitic liver contains

the necessary antigen in large amount, and opened the way to further chemical investigations.

The first influence of the new discoveries was to bring an end to the hopes that had been entertained as a result of Neisser, Bruck and Schucht's (109) researches of our being able to demonstrate the existence of syphilitic agents in patient's blood. It had been thought that, in the presence of a specific anti-body, complement-fixation would indicate the presence of the specific antigen, but this procedure is of course useless unless one is quite sure of the specificity of the anti-body. This was just the point now put in doubt, owing to the multiplicity of the antigens that the supposed anti-body reacted to.

Speculation now began to follow a different route from that at first suggested. Early in the history of the discovery it was widely surmised that the supposed anti-body might be the actual cause of parasyphilitic affections through the effect on the nervous system of its excessive production; Loewenthal (84) developed this theme very interestingly. The fact that the anti-bodies were sometimes present in the cerebro-spinal fluid in general paralysis in larger quantities than in the blood serum led Plaut (121) to suggest that in this affection they might originate in a local production on the part of the nervous system and thence secondarily reach the blood. It is now thought more probable, *e. g.*, by Weil and Braun (155), that the reverse is the order of events, the anti-bodies being secreted from the blood into the cerebro-spinal fluid, in the way that occurs in so many other maladies.

Although Wassermann still adheres, with unimportant modification, to his original contention that the active substance in the blood is a specific anti-body (though not necessarily a protective substance) formed in response to the syphilitic infection, the majority of workers now hold that even if it is thus formed it is not a specific anti-body in any ordinary sense of the term. Marie and Levaditi (92) found that the cerebro-spinal fluid of general paralytics exerts no bactericidal action on the Treponema pallidum, and although this does not prove that the fluid contains no specific anti-body, for diphtheria antitoxin, for instance, is in no way inimical to the life of diphtheria bacilli, and, as Neufeld and

Händel (110) point out, a complement-binding immune body is not necessarily a bactericidal amboceptor, still in other examples of spirillosis infection the anti-bodies are bactericidal, and it might have been expected therefore that they would be so here also. At all events it does not seem justifiable to call a substance a specific anti-body when it has the property of fixing complement in the presence not only of the specific antigen but also of all kinds of indifferent bodies.

The next step in the progress of research was a more accurate investigation of the nature and composition of the antigen on the one hand and the so-called anti-body on the other. There is still a considerable lack of harmony on many of the issues raised, even on the elementary point as to whether the substances are of a proteid nature, and so precipitable by alcohol, or of a lipoid nature, and soluble in alcohol. The nature of the antigen and of the anti-body will be separately discussed.

Levaditi and Yamanouchi (81) were the first to point out that the *antigen* or active substance of the syphilitic liver is soluble in alcohol. The solution remained unaffected at a temperature of 80°, thus differing from a watery solution. On analysis it yielded bile salts and lipoid. This conclusion has been confirmed by Landsteiner, Müller and Pötzl (71), Noguchi (112), Gross and Volk (53) and Porges and Meier (126). The last named writers employed the following procedure. To an aqueous extract of a syphilitic liver they added four times its volume of alcohol. They then removed the precipitate and redissolved it in a quantity equal to the original of physiological saline. The filtrate was dried at 40° C., and the residue similarly dissolved in the same quantity of physiological saline. It was then found that the active principle was present in the alcoholic extract (the filtrate), and not in the precipitate. The same writers consider that the alcoholic extract is stronger than the watery one, and although this is not generally held, yet, according to Fleischmann (38) it retains its activity longer. Noguchi (112) showed that the antigen is also soluble in acetone. The view, suggested by Porges and Meier (126), has been widely held that the active substance is lecithin itself, which is the most efficacious of the chemical substitutes for antigen. Gross and Volk's observations (53), however, appar-

ently disprove this. They added lead acetate and ammonia to an alcoholic extract of the human heart, and found that the fatty acids were precipitated while the lecithin present remained in solution. Acidification of this solution immediately made it inactive, and they then evaporated it to dryness and dissolved the residue in alcohol and ether. The resulting solution still contained lecithin, but would not act as antigen when tested in the usual way. They concluded that the active antigen in the Wassermann's reaction is a body akin to, but not identical with, lecithin, and that it generally accompanies this substance.

Although from the observations of all the above writers it would appear certain that the antigen is of a lipoid nature, yet Weil and Braun (157) found that, if a watery extract of the organ is shaken with petroleum ether, so that all lipoid is removed, its efficacy remains practically unimpaired. They therefore maintain that lipoids alone cannot account for the antigen activity of the organ, although they admit the efficacy of alcoholic extracts. A very interesting contribution to this subject has been made by Beneke. Incited by Sachs and Altmann's discovery that soap (sodium oleate) can act as antigen, he instituted histological researches on the livers of children still-born with syphilis. He found that there is a very great deal of fat present, and that the fat-droplets stain deeply with Löffler's methylene blue, whereas ordinary fat-droplets are not stained with it. The pellicles consist not of lipoid but of soap, which passes over into both watery and alcoholic solutions. He interprets this as being due to hepato-autolysis, and suggests that we have in the soap material the active agent in the Wassermann reaction.

With regard to the so-called *anti-body* of the serum and cerebro-spinal fluid the number of definitely ascertained facts is not so great. Levaditi and Yamanouchi (82) maintained that the active substance in the serum was soluble in alcohol, and that the solution yielded on analysis lipoid and salts. Noguchi (112) does not agree with this, and his careful work seems to prove on the contrary that the substance is insoluble in alcohol. He considers that it is of a proteid nature, and has fully studied its chemical relationships. On fractioning the proteid he finds that the albumin component is inactive, and that the substance resides in the

globulin. As it is not dialysable through celloidin he concludes that the active component is a euglobulin, in which he is supported by Elias, Neubauer, Porges and Salomon (31) and Gross and Volk (53). He finds that the serum is inactivated in 20 minutes at 70°-76° C., but that drying at 24° C. does not affect its efficacity. Cerebro-spinal fluid is inactivated in from 10 to 20 minutes at 70°-80° C., as was also pointed out by Marie and Levaditi (86). The active substance is destroyed by acids, alkalies, trypsin in the presence of weak alkali, pepsin in the presence of weak acid (this in spite of the pronounced anti-enzymotic properties of blood serum), and in three hours by the combined action of a photodynamic substance, such as eosin, and sunlight. The serum will maintain its efficacy for at least a year, a fact also pointed out by Bruck and Stern (15).

The next point that seems to be established, from the researches of Levaditi and Yamanouchi (82), Bauer (6) and Gross and Volk (53), is that the active substance in the serum is in small quantities a normal constituent thereof, and that it has in itself a certain power of fixing complement and so prevent hæmolysis. This power is thus increased, but not created, by the addition of antigen. According to Bauer (6) there is in the normal serum of adults, though not of infants, a hæmolytic body which masks the complement-fixing power of the so-called Wassermann anti-body unless this is increased by the addition of antigen.

The relation of the anti-body to lecithin must now be considered, although several matters in this connection will be left till the consideration of the Porges-Meier reaction. Breton, Massol and Petit (14) have shown that certain cerebro-spinal fluids have the power of binding lecithin. This is tested by means of the knowledge that lecithin has the capacity of activating cobra venom so that this can bring about hæmolysis; if the lecithin is already bound by the substance in the cerebro-spinal fluid then this capacity can no longer be exercised. Lecithin itself is hæmolytic, but the fluids in question, by fixing the lecithin, inhibit this capacity as well as the capacity of releasing the hæmolytic powers of cobra venom. This faculty of certain cerebro-spinal fluids is, however, not always to be correlated with their efficacy in giving a positive Wassermann reaction; for instance, out of 35 cases, 16

gave a positive Wassermann reaction and 19 showed the power of binding lecithin, but only 8 of them showed both. It is probable, according to Bezzola (9), that the power of binding lecithin and of binding serum complement is due to two different factors. Peritz (115), however, maintains that it is the anti-body itself which combines with the lecithin, and he puts forward the interesting suggestion that it is through this binding of the lecithin of the nervous system, and its consequent excretion (in the fæces), that parasyphilitic diseases, including general paralysis, actually arise. He carefully examined 23 cases of general paralysis and tabes from this point of view and found an increase of the lecithin in the blood serum and cerebro-spinal fluid. The increase was greatest in the cases that gave a negative reaction with the Wassermann test, a fact which he explained on the assumption that the anti-bodies were all saturated with lecithin and so could not give the reaction. Wassermann (147) also thinks it probable that this action of the anti-body on the lecithin of the nervous system is concerned with the genesis of parasyphilitic diseases. Against this, however, may be urged the consideration that lecithin is present chiefly in the white substance of the nervous system, whereas parasyphilitic diseases are more probably primary affections of the grey matter. In this connection it is interesting to note that lecithin exerts no beneficial influence in syphilis. Indeed, Oppenheim (113) states that it probably makes the disease worse. Pighini (118) finds that the hæmolytic power of lecithin is also destroyed by cholesterin, which is of course soluble in alcohol, and suggests that it is the active agent in the alcoholic extract of the liver. As we have seen above, however, it is very doubtful if cholesterin can at all be regarded as an antigen; in any case its activity in this direction is a very limited one.

Citron and Reicher (23) have studied the fat-splitting powers of luetic sera, and find that all sera giving a positive Wassermann reaction have a heightened lipolytic capacity, as tested chiefly against lecithin. They suggest that the anti-body acts on lecithin and splits it, giving rise to fatty acids, and that the diminished alkalinity thus brought about is an important factor in allowing the Wassermann reaction to take place. That it cannot be the only factor, however, seems certain from the exact investigations of Sachs and Altmann (132) on the subject of the influence of the

reaction on the results of the Wassermann test. They found that the addition of normal sodium hydrate solution, which in itself has no hæmolytic action, to the extent of from 1/800 to 1/3200 part of the volume will prevent an otherwise positive Wassermann reaction. The addition of acid will often induce a positive result in a serum that otherwise gave a negative one; thus the addition of from 1/1000 to 1/2000 part of normal hydrochloric acid brought about a positive result in seven cases of lues that had otherwise given a negative one. They showed, however, that the peculiarity of positive reacting syphilitic sera could not reside solely in diminished alkalinity, for acidification could not induce a positive reaction in a non-syphilitic case, but that another factor must be operative, for the action of which diminished alkalinity is a necessary factor.

The views at present held as to the essential nature of the phenomenon are thus beginning to issue with increasing clearness. Wassermann (147) himself holds that it consists in an interaction between specific substances in the serum, formed as the result of syphilitic infection, and lipoid material, lecithin being the chief carrier of the reaction. On the other hand most workers hold that it is not a question of the combination of a specific antigen with a specific anti-body, but, as Elias, Neubauer, Porges and Salomon (31) put it, an interaction between certain hydrophile colloids, closely allied to lecithin, and a changed form of serum globulin. The interaction is held by these authors, as also by Weil and Braun (156), Much (103), Porges and Meier (126) and Pappenheim (114), to be a colloid precipitate formation, for on the one hand, as Citron and Reicher (23) have shown, luetic sera have the power of causing precipitation in liquid emulsions and soap solutions, and on the other most substances that will act as antigens in the Wassermann reaction will cause a precipitate when added to luetic serum.

Only Levaditi and Yamanouchi (82) think that the substance present in the serum is, like the antigen, of a lipoid nature. Like other workers they regard it as being caused by tissue disintegration. The large majority of workers hold that it is contained in the euglobulin of the blood serum or cerebro-spinal fluid. Elias, Neubauer, Forbes and Salomon (31), Pappenheim (114), Weil and Braun (156) and Much (103) consider that the change in

the euglobulin is of a delicate nature, too fine to be revealed by the salt tests, and probably of the nature of an auto-anti-body formed in response to extensive tissue disintegration. The last suggestion would explain the occasional occurrence of the reaction in other diseases characterized by profound katabolic changes. From the fact that leucocytic extracts have some power of fixing complement Pappenheim (114) considers that these cells are the seat of origin of the abnormal substance, in which view he is supported by Marie and Levaditi (86).

The second sero-diagnostic method to be discussed is that first described by Porges (125), and generally known as the Porges-Meier (126) reaction. It consists in a flocculent precipitate that appears in a lecithin emulsion when luetic blood serum is added to it. The lecithin is best prepared from egg-yolk, which is triturated and shaken with physiological saline solution to which ½% phenol has been added. In 50 cases reported by Porges he found that the test gave results agreeing well with the results of the Wassermann test. Gross and Volk (52) confirmed these results, but subsequently (53) they expressed doubts as to the value of the reaction in comparison with that of Wassermann. Of 41 cases of lues 37 gave both the Porges-Meier and Wassermann reaction, 2 only the former and not the latter, and 2 only the latter and not the former; of 21 non-luetic cases 2 gave a positive Porges-Meier reaction, 19 a negative. They found that the precipitate contained the complement-binding substance active in the Wassermann reaction, a fact that bears out the conclusion mentioned above to the effect that the Wassermann reaction consisted essentially in a colloid precipitate formation. It does not necessarily follow, however, that the substance that causes the precipitate with lecithin is actually the same as the complement-binding substance, and indeed Von Eisler (28) expressly denies this. He was led to this opinion by finding that as many as 20 out of 23 cases of severe tuberculosis gave the Porges-Meier reaction, in other words a percentage just as high as with lues, and hence refuses to accept the reaction as being in any way specific. He disproved Stoerh's objection that the precipitation was brought

about by the phenol of the emulsion. Though his conclusion may represent too disbelieving an attitude still there is no doubt that the contention of Elias, Neubauer, Porges and Salomon (31) to the effect that the reaction is of equal value with that of Wassermann can no longer be maintained, particularly in view of the frequency with which it occurs in non-leutic maladies. These authors themselves have found it positive in a case of diabetic acidosis (29), and in 8 out of 77 control cases. Nobl and Arzt (111) found it positive in 68 (82%) of 83 cases of lues, and in one non-luetic case; the frequency of a positive reaction was just as great in the manifest as in the latent cases, whereas Elias, Neubauer, Porges and Salomon (32) find it to be greater in the latent, and therefore not so well treated, cases.

The last named authors (29) found that a similar reaction occurred when sodium glycocholate was used instead of lecithin, and Nobl and Arzt (111) have found the same with sodium oleate. Fritz and Kren (51) get better clinical results with sodium glycocholate than with lecithin. Of 51 cases of manifest lues 63% gave a positive reaction with lecithin, of 26 cases 65% gave one with sodium glococholate. Of 8 cases, in which the results were not parallel, the clinical diagnosis agreed with the indication of the lecithin test in two instances, with that of the sodium glycocholate in six. Of 22 non-luetic cases (tuberculosis, lupus, leprosy, mycosis, ulcer) that were tested with both reagents 13 gave a positive reaction with lecithin, and only four with sodium glycocholate.

From a clinical standpoint we may agree with Kurt Meyer's opinion (97), that the value of the reaction in diagnosis is not very great. It, however, throws a light on some of the theoretic problems of the Wassermann phenomenon. Von Eisler (28) has shown that most normal animal sera have the power of causing a flocculent precipitate with lecithin emulsion, and Toyosumi (146) points out the striking resemblance between the reaction and the agglutination phenomenon with bacteria, a matter to which we shall again have to refer. The relation between hæmolysis-inhibiting substances in normal sera and the substances that have the property of binding or precipitating lecithin is evidently very close, and deserves further elucidation.

Klausner (61) found that the addition of large quantities of distilled water to fresh luetic serum caused a precipitate within 15 hours. He obtained this in 31 cases of lues, and failed to obtain it in 23 control cases. He finds it present (64) in all stages of the affection, provided only that no treatment has been instituted. The discovery led to a discussion of priority between Wassermann (138) and Klausner (63).

Nobl and Arzt (111) found the test positive in only 55% of 55 cases of lues, and Fritz and Kren (51) in only 46% of 24 cases. Further it was soon found that it was frequently positive in many cases of severe illness, such as pneumonia, typhoid, tuberculosis, etc. Thus Schereschewsky (136) found it in four cases convalescent from scarlet fever. Klausner, in his later contributions (62, 64), admits that it is often positive in such cases, but still holds that it is very characteristic, though not specific, for florid syphilis.

The precipitate is, according to Klausner (61), of the nature of a globulin, which is generally thought to be increased in luetic serum as well as in many other affections. The test, therefore, is of the same nature as those described by Noguchi,[5] and the present writer,[6] and is certainly not specific for syphilitic disease, except when applied to the cerebro-spinal fluid, and then only in chronic maladies.

Landsteiner and Mucha (70) found that when rabbits were inoculated with syphilitic material rich in spirochætes the serum acquired the property of inhibiting the movements of spirochætes *in vitro*. This is evidently akin to the Durham-Widal phenomenon of typhoid and other infections. In the secretion taken from syphilitic papules an agglutination was to be seen, which the authors attribute to a local formation of anti-body. Zabolotni and Maslakowetz (163) have observed with the serum of individuals

[5] Bolduan: Immune Sera. 3d. ed. 1908.

[6] Ernest Jones and G. W. Ross: On the use of certain new chemical tests in the diagnosis of general paralysis. Transactions of the Ontario Academy of Medicine, Jan. 26, 1909. See also, Ernest Jones: The proteid content of the cerebro-spinal fluid in general paralysis. To appear shortly in the Review of Neurology and Psychiatry.

who have long suffered from syphilis a strong agglutination of spirochætes.

Investigation on agglutination phenomena in connection with syphilis are, however, as yet in a backward state owing to the difficulty of obtaining artificial cultures of the Treponema, so that only fresh secretion from Treponema-containing lesions can be utilized.

Michaelis (99) stated that the extract of a syphilitic liver causes a precipitate on being added to the serum of a luetic patient. Plaut, Henck and Rossi (124) have adversely criticised this observation, and find that the precipitate, or rather clouding, occurs just as often if non-luetic serum is used as if luetic, or if normal extract is used as if syphilitic extract.

Fornet and Schereschewsky (42) have described what they claim to be a specific precipitation phenomenon that is brought about in the following way. Equal quantities (0.15 ccm. or 0.2 ccm.) of luetic serum and the serum of a case of parasyphilis are gently brought together, in the way employed in the Heller ring test for albumin. A fine ring occurring at the junction constitutes a positive reaction. The authors interpret the phenomenon as being brought about by a specific substance (precipitogen) present in the luetic serum and a specific substance (precipitin) present in the serum of the parasyphilitic. They maintain that neither of these substances is identical with the so-called Wassermann anti-body; further that the precipitogen is found in recent cases of syphilis, and the precipitin, which is a secondarily formed substance of the nature of an anti-body, in old cases. Fornet, Schereschewsky, Eisenzimmer and Rosenfeld (46) publish 27 cases of lues, in 13 of which precipitogen and in 11 of which precipitin were found. Four of the former cases were of a parasyphilitic nature, from which it is evident that cases of general paralysis had to be investigated for both precipitogen and precipitin. Controls are of urgent necessity. Precipitogen is obtained by taking blood in which spirochætes have been demonstrated; with such blood serum the serum of paralytics should give a precipitate. Fornet

and Schereschewsky have repeated their contentions in several articles (41-45), in one of which (42) they published 50 cases. They admit (45) that precipitin may sometimes be found in normal sera, though it is always difficult to exclude the possibility of lues in such cases, but never precipitogen.

Plaut, Henck and Rossi (124), however, in a very damaging article based on extensive observations, have shown that no specificity can be adjudged to the precipitation phenomenon. They find that the ring formation occurs just as often between a normal serum and luetic serum, or even between two normal sera, as between two luetic sera. Fornet and Schereschewsky's (45) finding that a precipitin-containing luetic serum never gives a precipitate with normal serum Plaut and Henck (123) pointed out to be due to the fallacy of testing a given luetic serum with only one normal one; if it is tested with a series of normal sera, then a precipitate will be found to occur in a certain number of these. Alzheimer (2), Bruck and Stern (15), and Wassermann (33) all agree with Plaut in denying specificity to the Fornet-Schereschewsky phenomenon. It is certainly most suspicious, as Kurt Meyer (97) has pointed out, that precipitogen should be found in such late cases of syphilis as Fornet and Schereschewsky maintain, for this is contrary to all our experience of anti-body formation. It also seems certain that the so-called precipitins occur in a large proportion of non-luetic cases.

Neisser (108) and Wolff-Eisner (162) simultaneously reported some results of the application of the cutaneous reaction in the diagnosis of lues. The test is based on the analogy with the reactions obtained with typhoid, tubercle and other bacilli, in which over-sensitiveness to cutaneous inoculation toward given micro-organisms is revealed by a marked local reaction. Further experience is necessary to determine the value of the test.

Summary.

In attempting to formulate a judgment over these seven new methods for the diagnosis of luetic disease, we can deal with some very briefly. The Landsteiner-Mucha agglutination phenomenon

and the Neisser-Wolff-Eisner reaction have up to the present not been sufficiently investigated to enable us to see how useful they will ultimately prove to be. Difficulties in connection with the cultural characteristics of the Treponema warn us against being too sanguine about any early practical result being reached by this route.

Three other methods, those of Klausner, Michaelis, and Fornet-Schereschewsky respectively, have been carefully investigated by skilled workers, notably Plaut and others, and do not seem to have stood the ordeal well. The evidence before us points strongly to the conclusion that at present they have not been sufficiently developed to be regarded as in any sense specific reactions, or even to be characteristic enough of lues to be of any practical value. They all however point to what may be fruitful lines of research for the future.

The Porges-Meier reaction is of great theoretic interest on account of the study it affords of the relation between luetic serum and certain lipoid bodies, and the light it thus indirectly throws on the nature of the Wassermann phenomenon. On the clinical side it appears to be of some value in the diagnosis of syphilis in its various stages, although it assuredly cannot be regarded as a specific phenomenon nor as one rivaling in accuracy of results the Wassermann reaction.

The Wassermann reaction is beyond all doubt the test of the greatest interest and importance among those under consideration. Its great practical value and precise diagnostic indications, particularly in connection with psychiatry, have already been summarized in the corresponding section of this review, and need not again be repeated, so that it only remains shortly to express what seems to be most certain in regard to its essential nature.

The reaction may be evoked not only by the use of syphilitic liver extract as antigen, but by a large series of substances, most, or perhaps all, of which are of a lipoid nature. These lipoids are probably present in especially large quantities in syphilitic organs, but there is no reason why they should occur to some extent in other material. They act on the blood serum, or cerebro-spinal fluid as the case may be, of syphilitics by interacting, probably as a precipitation phenomenon, with some substance that is contained

in euglobulin; the combination has the power of combining with complement, and thus of inhibiting hæmolysis.

The substance in the serum is a normal constituent thereof and has of itself some anti-hæmolytic power, which is increased during the interaction just mentioned. Whether the increase of this substance that takes place in syphilis originates in the luetic agent itself, or is evoked as an anti-body in response to the syphilitic infection or in response to the tissue disintegration caused by this infection are questions as yet unanswered. Affinity for lipoids, notably for lecithin, appears to be one of its characteristic attributes, and it is possible that this may be important, not only in the Wassermann reaction, but in relation to the morbid processes in the body induced by the syphilitic infection.

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POSTSCRIPT.

The subject was briefly expounded at a meeting of the New York Neurological Society, October 6, 1908, by Bolduan, Castellis and Noguchi (Journal of Nerv. & Ment. Dis., Feb., 1909, p. 100-102). No facts, however, not discussed in the present review were elucidated. The same remark applies to a discussion at the Psychiatrischer Verein, in Berlin, on 19 December, 1908 (Neurol. Centralbl., 16 January, 1909. P. 106-11), which was opened by Edel and participated in by Liepmann, Schuster, Ledermann, Lesser, Munter, Frenkel and Döblin.

Since the above review was written the following articles have come to my notice, so that the list of publications here referred to is nearly 220. None of the conclusions above reached is appreciably modified by the work published in the articles not there dealt with, which merely confirm or expand previous investigations.

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THE PROBLEM OF THE STATE IN THE CARE OF THE INSANE.*

By ADOLF MEYER, M. D.

There is in the fabric of our large sociological unit, the State, one great field in which the physician is the agency to be relied upon for proper work, although it is not usually included in the domain of the Health Officer. We find here the insane, and the feeble-minded and the epileptic; and reformatory work. Very few people appreciate what the task involves. The whole modern change of front in the struggle against essentially chronic diseases in the direction of prevention and the radical transition of modern practical sociology from charity to efficiency offers a natural opportunity for a discussion of the question: *What has the State got to meet in the care of those afflicted with mental disorders?* We are to-day confronted with the problem of so-called State care in this State. That is but part of the whole problem. What is the specific problem?

A fairly large number of our people are exposed, or expose themselves, more or less constantly to conditions in which they jeopardize the health of their brain so as to endanger their individual and social plasticity and efficiency. Many of the resulting difficulties and disorders of balance are merely called nervousness; others interfere so deeply with conduct and behavior, and even the possibility of any regulated conduct and behavior, that the patient's judgment becomes so untrustworthy that to let him follow his morbid will or bent would be a crime—as much so as if you should let a patient in typhoid delirium go to ruin in the wandering of his mind and under its effect on conduct. Thus there are conditions in which it has been found best to give the patient even unsought protection against himself and against strangers, and at times even against his relatives; and it has

* Read at a meeting in the interest of State Care of the Insane held in Baltimore, under the auspices of the Maryland State Lunacy Commission, January 20, 1909.

become a law in most countries that a patient reduced in his capacity of self-conduct and self-determination shall be given the benefit of special supervision by the most impartial and also best organized authorities, and the benefit of care in hospitals which stand under a special pledge (or license), a few of them private, but most of them created by the State. It is the nature of the diseases with their peculiar effect on the legal status of the patient that has led to the demand for a monopoly by our most impartial and most circumspect agency, the State, in the form of complete State care and under these circumstances the State must become equal to a tremendous responsibility, and especially so under our modern conceptions of what the fight against relatively chronic diseases means. Not only must the State or the public provide for the best possible medical treatment and for the physical welfare and comfort of its huge number of patients, but it must strive to make its institutions centers of progress, which must be concerned not only with meeting the emergencies of the day, but with the more far-reaching problems of prophylaxis and of stemming the tide of increase. The institutions for the insane must indeed become the nucleus of a far-reaching work for social and individual mental hygiene and mental readjustment.

Who are the objects of this State provision?

When we mention the insane and mentally defective, the large number of even supposedly well informed persons, among them many physicians, think of a mass of unfortunates doomed by heredity and fate, and hopelessly wrecked, to be segregated as much as possible, provided with proper care, but kept from complicating the life of the normal and from adding to the number of the degenerated.

This sweeping generalization of thinking merely in terms of an "insane class," with the motto "Once insane always insane" is a grave misconception.

In such a State as New York with 8,000,000 inhabitants, and an excellently organized system of State provisions and State supervision, there is to-day one out of each 280 persons under the care or supervision of the Lunacy Commission: over 29,000 in State institutions, and about 1000 in private institutions—an obvious increase over the figures of 1905. These 30,300 persons

are not simply a gradually increasing special class of permanent inmates, but include, as in all hospitals, a fair number of patients only temporarily under treatment. The number of patients admitted per year, exclusive of transfers, reaches over 6000, *i. e.*, over one-fifth of the total number figuring as the capacity of our hospitals; 25 per cent leave well and as many improved. This proves that there is quite a little change in the constituency of the ranks, so much so that we can speak of a class only with considerable reserve.

I wish I could give you exact figures as to how many now in active and responsible life in the community have been in some hospital for months, or for one, two, three, ten and more years, and as to how much time of efficient life has been restored to them by the stay at the hospitals. Most of these facts are not obtainable owing to the insufficient way in which the data are collected by our as yet inadequately organized official departments. But we have some reliable figures after all. As we have seen, the number of cases admitted from their homes per year reaches the ratio of over one-fifth of the total number figuring as capacity of our hospitals; of this number an equivalent of a little over 25 per cent leave the hospital restored to their previous standards, that is, recovered and capable of taking care of themselves; and easily 25 per cent more become well enough to get along at home, while the remainder does indeed swell the ranks of the more permanent hospital population, the non-recovering more than balancing the deaths. The actual hospital residence of the cases which entirely recover covers from a few months to several years; 25 per cent of those who recover have had hospital care for over one year and quite a few must perforce for two, three, four, or more years be part of the more permanent hospital population, whose care therefore must be kept up to a mark, with an atmosphere of activity and hopefulness, and not that of indifferent provision for mere incurables.

The grave responsibility of the work, especially with cases during the first year, is shown by the statistics of 1905 in New York, according to which the total death-rate in the institutions per year was 8 per cent, and 40 per cent of all these deaths occurred among patients in the first year after admission. 15.6 per cent of those

admitted die within a year. You thus see how the admission rate raises the responsibility resting on a hospital. Some of the deaths are inevitable; others are not, and may take away recoverable persons. That is a point on which we should have statistics to compare the efficiency of hospitals. How many recoverable cases are lost annually from avoidable causes?

Looking back over these figures derived from the experience in New York, we evidently find that among those afflicted with mental disorders there is, to be sure, a certain number who form an essentially custodial problem, while at least one-fifth of the beds are occupied transitorily. We shall find the number of transitory inmates even greater in Maryland, hence my warning against merely speaking of a "class." Further, the fact that 25 per cent of the quarter of the admissions which recover do so after a hospital residence of more than one year, and that it is by no means possible to make a sharp line between recoverable and non-recoverable cases, shows why it is not likely that a clean-cut division into custodial asylums and treatment hospitals for the recoverable can be thought of. *The insane are not a definite class* settled for good or for bad. We must speak of so many beds required or occupied, and the next question is for what varieties of the diseases?

The most rational *grouping of mental disorders* is that according to causes and their more or less specific effects. In a complex organism such as man, we can of course not expect simplicity and uniformity, but we always meet a combination of different degrees and kinds of causal influences working moreover in different types of make-up or constitution, and with decided individual variations of type of manifestation, course and outcome. But after all, the cases form natural groups of considerable individual significance. I shall merely pick out a few units of special importance which point to relatively plain differences in various strata of the community.

I studied the mental disorders due to alcohol in my observations at the Worcester Insane Hospital, Massachusetts, and found striking differences in percentage. Among the patients of Protestant Massachusetts stock committed to the hospital only 9 out of 100 had some form of alcoholic insanity, while among the men pa-

tients born in Ireland 50 per cent had characteristically alcoholic disorders and, of course, quite an additional number had a record of alcoholism as merely a complicating factor—a striking evidence of the differences of the problem of prevention in the two units of population. Comparative statistics of country and city districts worked up by the Willard and St. Lawrence Hospitals bring out the fact that while a city of 120,000 furnishes 15 per cent of its commitments with general paralysis, rural districts furnish only 6 or 5 per cent, showing the difference in the frequency of syphilis in these regions. On the other hand, the country districts as compared with the cities furnish more than twice the number of agitated depressions, strong evidence that the country has its own faulty ways of reacting to difficulties. The recent racial statistics worked up by my associate, Dr. Kirby, on the admissions to the Manhattan State Hospital during the last year give additional highly instructive data. Here again we see striking contrasts: typically alcoholic mental disorders reach 27 per cent among the Irish, while the Jews did not offer more than 1 case, and that one complicated. On the other hand, general paralysis figures with but 7 per cent among the Irish, and with 29 per cent among the negroes, and 20 per cent among the Germans, a glaring signal as to where the work against the spreading of syphilis must be done. The functional psychoses, the direct disorders of mental hygiene and mental balance, show analogous differences, very high figures among the Hebrews, small figures among the happy-go-lucky negroes. All this suggests that differences in types and in conditions make themselves felt and that the occurrence of insanity is not merely the fatal and unanalyzable result of our active life. The suburban counties of the metropolitan district of New York have only from 2 to 4 admissions per 10,000 inhabitants per year, while the average for Manhattan Island is 8 to 9 per 10,000. Yet the commuter's life is far from being free of care, and the excess of the patients furnished by the more densely populated districts can hardly be laid altogether at the door of inevitable degeneracy.

So much for some types of diseases. From the point of view of *course and duration* I ought to present to you similarly individualized statements to bring home the fact that it is not a problem

merely of hospital-walls and of herding together set numbers, but a wide range of problems which we must learn to face intelligently. Allow me merely to point to some ratios of recoverability. General paralysis (by the way an absolutely preventable disease, to be stamped out by a truly efficient campaign against syphilis) leads to death with fatal necessity within a relatively short period averaging two years and three months, ranging from a few months to four or rarely more years. Senile dementia is equally ominous, a progressive and destructive condition. Among the alcoholic psychoses most forms are recoverable, the delirium tremens in a few days, the hallucinosis without plain delirium in a few weeks or months, but the paranoic or chiefly delusional and certain amnesic states last much longer and are apt to be chronic. Among the most frequent mental disorders we find the excitements and depressions depending on inherited or acquired make-up and divided into the essentially recoverable forms, among which we find the so-called manic-depressive insanity, and certain types which have a strong tendency to lead to chronic defect, a group called dementia præcox. These are varieties differing in their causes, their prospects, their provisions and needs of treatment so that indeed the so-called "insane class" ceases to be a unit of the population on which one could make quick and easy off-hand calculations.

General hospitals used to be largely receptacles for the poverty-stricken and helpless. To-day they are centers organized not as mere receptacles but as places of organized and efficient work. The provisions for mental disorders are still in the barbaric stage where legal certifiability, *i. e.*, the patient's actual incompetency or the discomfort of the environment is the criterion of admission, instead of the work to be done in treatment; thus we get only those types of cases together which appear forbidding to the ignorant, and this gives the whole problem of the care of mental disease the one-sided aspect of a specially odd field, for which the antiquated term *lunacy* has come down from the dark ages of superstition and still maintains an air of propriety.

The progress in the study of mental disorders according to their nature and not merely in bulk has brought many worthy consequences. The demands of the study of the individual case have

been raised. We realize distinctions between the cases and want to determine them and attack the facts accordingly, and instead of the pretty-cloud-effects of generalities we see more and more clean-cut problems.

The *medical work in well organized hospitals* has thus become a more and more definite task. To-day to ensure good work in a model State hospital, every patient is given a most thorough examination which must be much more painstaking than that in a general hospital, because our patients rarely can be depended on to draw attention to possible oversights such as are apt to occur, and might be specially lamentable. Further, to assure accuracy and control, the results of the examination and the patient are, in such hospitals as the Manhattan State Hospital, presented to the entire staff, in at least three staff-meetings and discussions. To do this well we have found it necessary to increase the number of physicians, and instead of making them merely physicians for inter-current diseases and chiefly the arch-supervisors of hundreds of cases sent them by judges for keeping and to be at least protected against hardship from the attendants, we urge them to take an active interest in the possible disentanglement of the difficulties of every individual case. No trouble is spared to get the facts for intelligent action and advice. An effort is made in co-operation with the State Charities Aid Association to have an agent in direct contact with the physician and with the patient, and also with the relatives outside while the patient is at the hospital, so that efficient simultaneous work can be expected in the adjustment of the conditions under which the patient had become ill, with a purpose similar to that of a Board of Health in providing for disinfection and quarantine in the sphere of the diseases that come under the charge of a Board of Health. We thus attain a *collaboration beyond the hospital walls* which is all-important with diseases which take sometimes months to develop under conditions which, so far, the hospital has not considered it its duty to investigate. A thinking person must marvel at the thought that mental disorders are allowed to progress without skilled help on an average with a period of partial incapacity lasting from 3 to 6 and more months before admission, and with all this our State and private receptacles have no organ-

ized connection. Chronic diseases are not properly handled by mere patching up. It is necessary to go to the root of the evil, even if we come too late for prevention in a special case, to straighten out the environment, and to prepare the patient to be able to meet reasonably those difficulties which cannot be removed. That must in part be the duty of the State, but it can only fulfill it in co-operation with the friends and with the communities which must be taught to be or to become a healthy environment fit for any one to live in, even for those with not especially favorable endowment. To simply deplore from year to year the increase of insanity, and to get into periodic panics over the necessity of building more hospitals, is not doing the work at the right spot, and to the best advantage. But to reach this modern goal, we have to make proper provision and *see that the work is actually done.* We are inevitably pushed to the conclusion that each hospital must be the center of organized work in its district, with the help of the profession and all those who will take an efficient interest in public and individual health.

The wide call for psychopathic hospitals is not merely a sentimental cry to avoid the, unfortunately, existing notion of stigma; but it is a call to secure proper care for individuals who need it badly, a type of provision which every general hospital should be able to give at least temporarily, until the most suitable steps can be decided upon. How many States are really ready to meet their obvious duties? An equally urgent demand is the organization of committees for after-care and prophylaxis. Our hospitals must not only be the centers of curative activity and standards of maintenance but since in all chronic cases prevention must come to the front, the hospitals must really use beyond the hospital walls the information they gain in the study and care of their cases. Our State authorities and the most intelligent and capable people should give all the support that a far-sighted policy can give. This is a task hardly realized as yet, except by a few hospitals in which a so-called prophylaxis and after-care movement has been initiated, in the sense in which I discussed it in the New York reports.

To be equal to this task it is necessary to co-ordinate the forces properly. The State should consist of fairly definite *hospital*

districts. The hospital must make it possible for the superintendent to be the organizer of the work not only in the business and medical arrangements of the hospital, but really in the whole activity of the district. A man worthy to be superintendent of a hospital for the insane cannot have a higher incentive for efficiency. To make it possible he must have a medical staff capable of similar aspirations and adequately trained to meet the emergencies. It goes without saying that institutions to be efficient must be of moderate size and located so as to serve a definite district. This is the only way to prevent the undesirable distances from the homes, compatible with the best principles of medical, administrative and prophylactic efficiency. In New York and Illinois the co-ordination of the hospitals into a State unit has, moreover, made possible the working of a central institute which is not only a place of research, but the place of training and equipment of the physicians for their special work until enough of the medical schools will be capable of providing adequate courses for *all* physicians and *all* their students.

This gives us a fair picture of the task with which a State must reckon.

1. The care of the insane is to be organized so that care is given at as early a date as possible, that is, *before* the time where now-a-days commitment is thought necessary.

2. A system of notification of a *Mental Health Board* is to make organized activity possible; and adequate provisions with hospital nurses, not policemen and jails, must be available pending the transfer to the specially organized hospitals.

3. The special hospital must have adequate treatment divisions where it is possible to become thoroughly acquainted with all the facts about the patient before his transfer into the ordinary observation wards for a more lasting stay.

4. Even in the wards for the supposedly more chronic cases, standards must be maintained that provide for the 25 per cent or more of recoverable cases whose illness lasts more than a year.

5. Adequate provisions must be made to become thoroughly acquainted with the outside conditions under which the disorder developed, and with the possibilities of an adjustment before the patient returns, so that such help or guidance as may be advan-

tageous to the patient and to his friends on his return from the hospital may be extended.

6. General organization of work must be carried out in the locality, according to its needs, among the various types of the community, not only with regard to checking alcoholism and the spreading of syphilis, but also with regard to healthy methods of living generally; emphasis must be laid on keeping the minds balanced with a due share of recreation and rest, and *satisfaction* with the *returns* of every-day toil.

This, and nothing short of this, is the task for the care of the insane, as we understand it to-day.

There is the problem! Why and how should the State undertake the organization?

As I look upon the situation in Maryland I cannot help feeling that we stand at the beginning of a systematic organization in which we shall have the advantage of the experience of several other States.

The program now seems plain. We must use, and supplement, careful reports on the local distribution of mental disorders: A census of the probably custodial population now scattered through many institutions of greatly differing standards; a census of the incidence of cases requiring hospitalization, in the different districts; a study of the character of the disorders and their breeding places, and the best ways of coping with the care and after-care, and further prevention of these disorders.

The next step is the study of a natural distribution of the centers of care, *i. e.*, of hospitals and the *organization of districts,* not so much according to counties as according to convenience of travel, with the formation of committees of after-care and prophylaxis in which we must rely on the civic spirit of our ablest physicians and non-professional citizens and the press.

A necessary supposition of the proper working of the program is a high standard of work in the centers of remedial activity, the hospitals, and sufficient power vested in the co-ordinative agency, the State Commission, and I hope there will be enough liberality to make efficiency stand above mere temporary expediency.

The task is not easy and it would be very immodest on my part to speak of the conditions with my knowledge derived merely

from printed reports. There is, however, something about a graphic presentation of the last annual report of your Commission in Lunacy that struck me forcibly enough to seem worth bringing before you.

Maryland shows a most remarkable contrast with other States in the fact that to-day more than one-half of the patients are attended to not by State Institutions, but by private and county institutions. The actual origin of the cases in the private institutions is not given; many patients may come from outside the State. But the ratio remains none the less remarkable.

I merely transcribe the figures of the annual report so as to get comparable pictures. The data are so arranged as to show the number of beds occupied at the beginning and at the end of the fiscal year; the two intermediate columns show, the first, the admissions; the second, the discharges; the male and female, white and colored, and in the discharges the recovered, improved and unimproved and dead are specified.

Looking over the groups we have first (Fig. 1) the two State hospitals, and the Bay View Asylum of the City of Baltimore, then (Fig. 2) as private institutions, the Mount Hope Retreat, the Sheppard and Enoch Pratt Hospital, and to avoid the need of a larger scale, the four other private institutions, the Richard Gundry Home, The Gundry Sanitarium, Riggs' Cottage and the Relay Sanitarium—treated as one. Then (Fig. 3), the County asylums, Montevue, Sylvan Retreat and Cherry Hill as one, and finally all the insane in almshouses. The provisions for the feeble-minded and defective, although most important in the general problem of State care, are omitted here.

Each unit shows the ratio of change and activity to the mere custodial work. The result is striking: the most active service in a public institution is that of Bay View Asylum, which is the one least fit in equipment, while Spring Grove is in a condition in which it cannot or does not accept as many patients as either the almshouses or the county asylums, which we are trying to eliminate. The bulk of the work is done by private institutions, which with the exception of Mount Hope Retreat have twice and nearly three times as high an admission and discharge column as cases at the beginning and end of the year, and therefore an atmosphere of maximum activity.

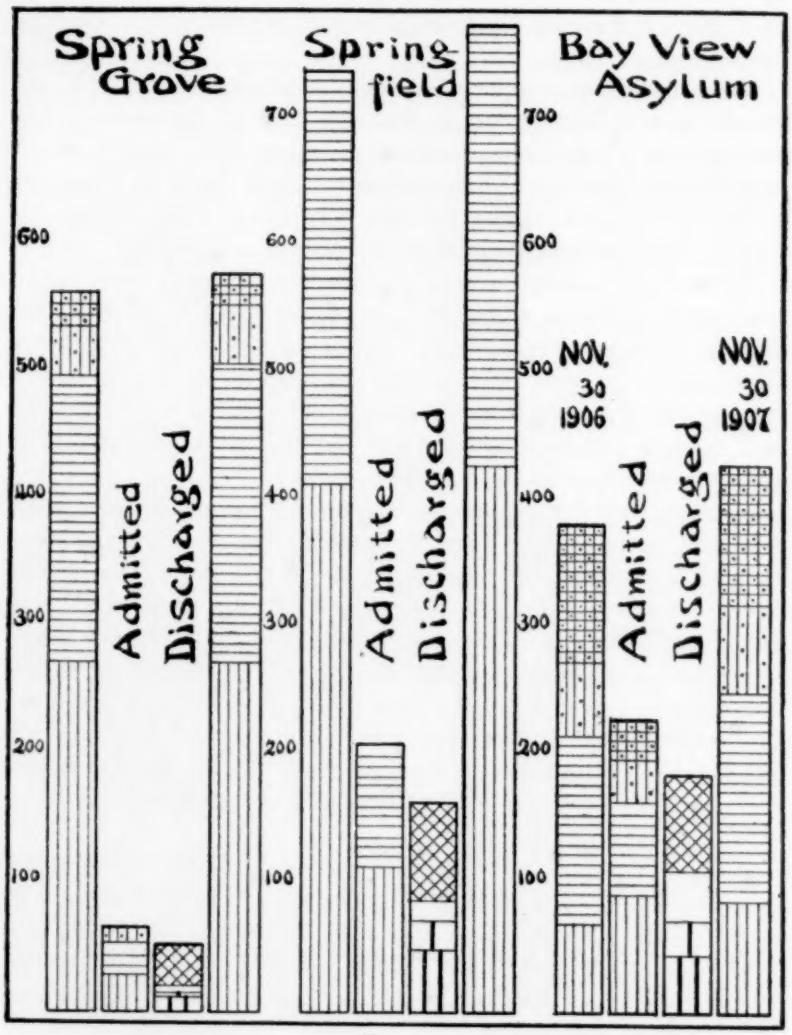

Spring Grove
Admitted
Discharged
Spring field
Admitted
Discharged
Bay View Asylum
NOV. 30 1906
Admitted
NOV. 30 1907
Discharged
700
600
500
400
300
200
100

FIG. 1.

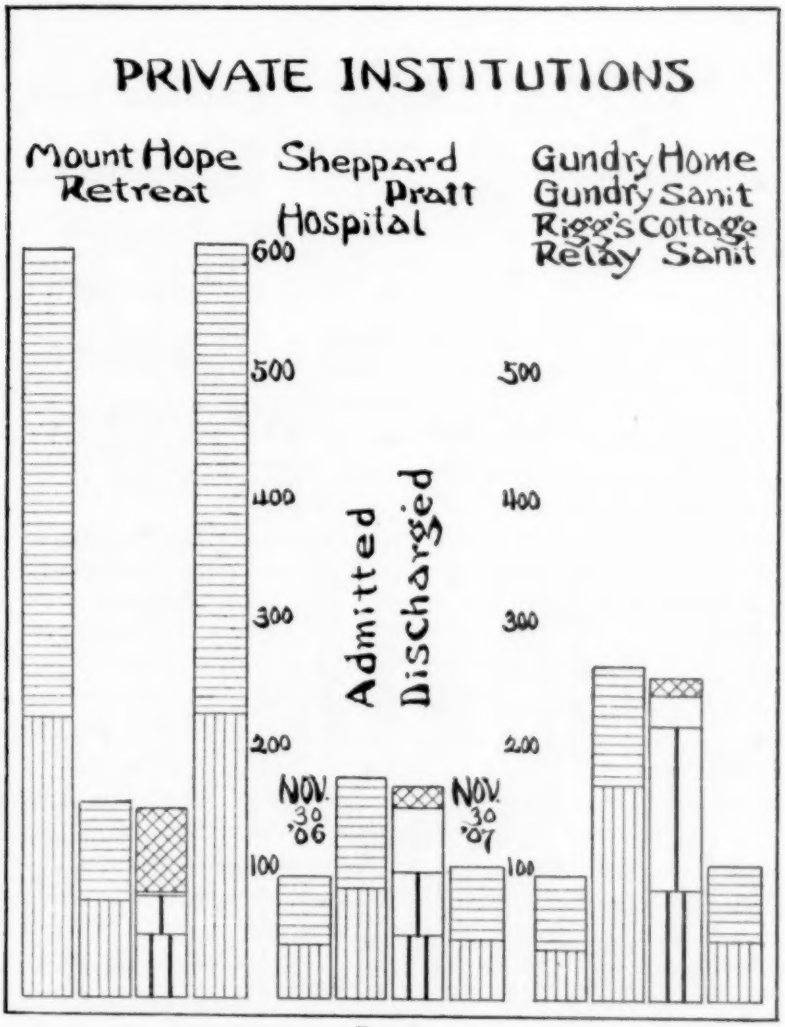

PRIVATE INSTITUTIONS
Mount Hope
Retreat
Sheppard
Pratt
Hospital
Gundry Home
Gundry Sanit
Rigg's Cottage
Relay Sanit
600
500
400
300
200
100
Admitted
Discharged
NOV. 30 '06
NOV. 30 '07

FIG. 2.

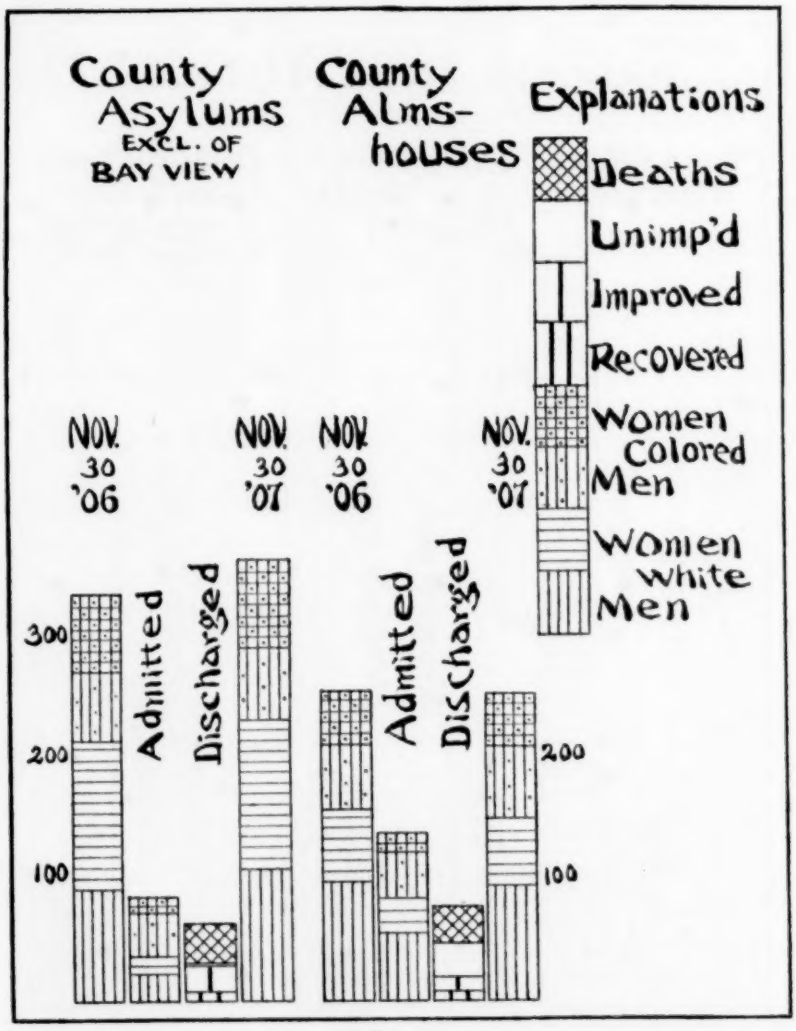

County Asylums
EXCL. OF BAY VIEW
County Alms-houses
Explanations
Deaths
Unimp'd
Improved
Recovered
Women
Colored Men
Women White Men
NOV. 30 '06
NOV. 30 '07
NOV. 30 '06
NOV. 30 '07
Admitted
Discharged
Admitted
Discharged
300
200
100
200
100

FIG. 3.

It may be well to put the facts together in still another way:

INSANITY STATISTICS OF MARYLAND.

	Private Institutions.	State Institutions.	County Institutions.	Almshouses.	Total.
Beds	822 (26%)	1357 (42%)	787 (24%)	248 (8%)	3229
Admissions	612 (46%)	275 (21%)	314 (23%)	134 (10%)	1335
Recovery rate (on admission)	31%	22%	16%	4.5%	23%
Fatal diseases to number of beds	12.1%	7.9%	12.9%	12.9%	10.5%

The total number of admissions in a year was 1335; how many of these are mere transfers and re-admissions is not said; but the number shows that there was a *change or at least a circulation of 40 per cent of the entire hospital population.* The recovery rate figured on the number of admissions is 23 per cent for all the admissions in the State, or 31, 22, 16, and 4.5 per cent in the four groups; the rate of fatal diseases or deaths figured on the number of beds is 10.5 per cent for the whole State, and 12.1 per cent, 7.9 per cent and 12.9 per cent and 12.09 per cent for the respective unit-types.

The whole State furnishes the following discharges: Recovered, 312: P. 193 (62 per cent); S. 60 (19 per cent); C. 53 (17 per cent); and A. 6 (2 per cent). Improved, 313: P. 222 (71 per cent); S. 25 (8 per cent); C. 54 (17 per cent); and A. 12 (4 per cent). Dead, 342: P. 100 (29 per cent); S. 109 (32 per cent); C. 102 (30 per cent); and A. 31 (9 per cent).

The number of admissions and cures and deaths gives us an index of the demands on nursing if not on curative skill, and in this we find the private institutions as centers of maximum activity as far as admissions and results go, but the county institutions and almshouses have the highest death-rate, in other words, the greatest number with fatal diseases and demands on nursing, and yet—what are their provisions? Dr. Herring will show us what is done for the patients who have this highest percentage of fatal diseases, and therefore really the greatest need of good nursing. Spring Grove compares most closely with the admission and

discharge rates of the County asylums and almshouses, and it has a death-rate of only 7.5 per cent. How many recoverable cases are hit by death in the places with the high death-rate?

We are evidently confronted with conditions which call emphatically for what the present Commission in Lunacy aims to achieve.

We are quite a distance from the plan dictated by our modern knowledge of the problem—that of having *hospitals for definite districts and an organization of these districts.*

But certainly the most immediate part of the program is the enactment of State care. What does it mean? It means the concentration of the most difficult task confronting us in the field ot maintenance of health of our nation, in the hands of those who have enough knowledge to see the whole problem before them.

I would not cast reflections upon those who now administer the county asylums. They probably do as well as they and their constituents consider necessary. As to the actual results, the photographs and concrete records of Dr. Herring will have to speak. The economic problem is naturally the standard of the tax-payer, and must be weighed carefully. But I can only say that the task of handling the custodial care should be in the hands of those who know the methods of remedy *and* of saving, and the possibilities of improving the condition of the supposed wrecks. There are too many sides to the question to be mastered by the untrained. The almshouses perpetuate wrong impressions which are at the bottom of a great part of the public indifference.

I have already taken too much time. Let me make my final appeal:

Maryland has just received the most remarkable practical stimulus towards the adequate treatment and study of mental disorders in Mr. Henry Phipps' magnificent gift to the Johns Hopkins Hospital. It already has some excellent private hospitals; it has two State hospitals which make very good use of their opportunities. But it also has its Bay View Asylum and its County Asylums and Almshouses which are residuals of a rapidly passing epoch.

Now there is a call for organization for the best and most practical and for a far-sighted policy.

Mental hygiene and all that goes with it is beginning to occupy the leaders of our nation and of our civic activity. Mental difficulties and mental disorders are not limited to asylums and never will be. The asylums and hospitals are, however, the sources from which the leaven of proper information and training must come forth. We must get standards and eradicate obstacles to wholesome development. It is not merely provision for hospitals that we are talking about, but provision for our citizens in times when they need advice, help and remedies. For this we need the best types of hospitals from which to organize the community—and an abolition of the centers of indifference. Away with mere charity notions! Efficient organization is the only fit watch-word for a democratic community.

"AM STEINHOF."

HOSPITAL AND SANATORIA IN VIENNA FOR MENTAL AND NERVOUS PATIENTS OF LOWER AUSTRIA.

By L. VERNON BRIGGS, M. D.,
Physician to the Mental Department of the Boston Dispensary.

A few miles outside the City of Vienna, on high land overlooking the city on the one side and surrounded on two sides by most beautiful hills, is situated the new hospital for insane and nervous patients which the Austrian Government has recently established, and which is to-day the most modern and complete hospital for the care of the insane in the world. The buildings—of which there are sixty, designated simply by numbers or letters and situated on the southern slope of a high hill—are spread out on a well-arranged plan of landscape gardening, and are connected by two hundred and thirty-five telephones and by a small electric tram railroad for transmitting materials from one building to another. The buildings cover an area of 53,909 meters and 734,186 meters, or 1100 acres.

Up to the middle of the eighteenth century, Austrian insane patients were confined in jails, where they were chained and fed like animals. The populace used to walk out to their place of confinement on Sundays and holidays and pay the guards a tip to show them the ravings of the maniacs behind the bars. Later the patients were transferred to the Spanish and City Hospitals, where they were still chained and subject to the violence of the guards. When the Main General Hospital was built in Vienna, Emperor Joseph II decreed that there should be erected one building exclusively for the mental patients. This circular insane tower, built about 1760, which is now used for storerooms and nurses' quarters, is situated at the rear of the General Hospital, was alone used for insane patients until 1803, when the so-called Lazarettes was added for quiet curable patients and also the great almshouse for quiet incurables. These institutions were maintained from funds partly reaching back to the time of the Crusades and partly from

the general funds of the City Hospital and the taxes of the local guilds. In 1811, an insane fund was formed from the above sources, which was administered separately. About this time the true nature of insanity was better understood and it became recognized as a disease. Lack of space led to plans for a new hospital, and in 1853 the so-called Brünnlfeld on the outskirts of the city was established. By a law passed February 17, 1864, the management of the insane fund was transferred to the House of Representatives, or—more specifically—to its medical sub-department. About the same time the use of the insane tower was abolished, it was sold and a new building bought and enlarged in Klosteneuburg. Another subdivision—the Roten Hofes Kierling—was opened in January, 1885, which in 1895 was remodelled and the name changed to the Insane Asylum in Kierling-Gugging, and in connection with this an insane colony was established at Haschhof. In 1893 the General Government started a plan of relieving local communities of the care of the insane, with the result that there was established in 1902 the Kaiser Franz Joseph-Landes-Heil-und Pflegeanstalt at Mauer-Oehling, and in this connection the Pflegeanstalt in Ybbs was opened; and there was also established a permanent system of family nursing and care in the country.

In 1902 the managers of the insane fund transferred their holdings from the Government of Lower Austria to the General Government for 13,000,000 kronens. At this time the site of the present hospital was acquired for 4,500,000 kronens and 22,000,000 kronens was appropriated for the buildings, which were erected by the Provincial Committee of Lower Austria. The group of buildings were begun in 1905 and in two years—or on October 10, 1907—they were finished. Five thousand mechanics and laborers were employed in the erection of the buildings and grading of the grounds, and when I visited there in October, 1907, three thousand were still employed. The government has restricted the land for miles around so that only small houses with gardens are allowed to be built.

The creators of this hospital are: The Representative of the House and Senate of Lower Austria, Leopold Steiner; the reformer of the insane care in Lower Austria, Fedor Gerényi; the

Chief Counsellor of Inspection, the clever architect, Franz Berger; also the Director, Dr. Heinrich Schloss (Gugging)—at the same time the first director of the new institution; and several others.

As you approach the site from the City of Vienna, you first pass the older hospital building and the Children's Hospital. You then drive through quite a strip of country, along a road where they were building an electric tram, when I was there, to facilitate the transfer of both patients and friends. Reaching a point in the main road opposite the hospital, you turn sharply to the right into a broad avenue which takes you to the main entrance, which is still quite a distance away. This approach contains many plots of grass and flowers, and rows of trees are planted on each side. After driving through this avenue you reach the main entrance of the hospital, from which well-built walls extend to right and left, in keeping with the older estates seen in this country.

The hospital, or asylum, consists of three parts: First, the asylum proper; second, the home; third, the sanatoria for wealthier patients. The accomodations are for three thousand patients. Just inside the entrance, and placed with a generous amount of ground around it, is the Administration Building, used also as a residence for many of the staff. The staff consists first of the director, who is the head physician, and who presides over daily conferences of the hospital physicians. Under him are four chief physicians; two each for the men's and women's hospitals. One of these is a vice-director, appointed by the House of Lower Austria, who is authorized to assume the direct responsibilities, rights and duties of the director in his absence. There are also three first assistant physicians; one for the sanatoria, one for the quiet patients, and one for the sick, or—more properly speaking—hospital patients. These men give written reports and data of each patient to the director daily. They take part in the qualitative and quantitative tests of foods, etc., also in the fire drill, and look after the safety of the patients and the servants. There are also twelve assistant physicians, twenty visiting physicians, and a superintendent or supervisor, whose duties are to look after and supervise the occupations of those patients for whom special work or active treatment is prescribed. He watches them in the workshop, the Zander room, in the bath, and everywhere they go, outside the

wards. He also arranges for and supervises the entertainments for patients outside the wards, looks after the medical treatment of the employees and their families, and is authorized to substitute in the hospital, excepting the sanatoria. During his spare time he aids the director in the written work of the hospital. All the assistants alternate between wards and buildings. Each assistant is on duty twenty-four hours; then rests.

A prosector is also appointed by the Pathologico-Anatomical University Institute of Vienna—with the approval of the Medical Department of the Government of Lower Austria—to look after the autopsies here and in other similar institutions of Lower Austria, also the histological, bacteriological and microscopic examinations.

All arrangements of physicians' visits are as much as possible for individual treatment, and the tubercular wards are always visited last.

The first story of the buildings is of local stone; the rest of light brick; the roof either tile or some prepared metal. The sewage is connected by five trunks to the city's main system. Back of the Administration Building is the theater or recreation building, with a garden and fountain in front, approached by stone steps from the left and right of the central entrance. I saw this entrance illuminated in the evening and it is most attractive. The walls of the theater, as well as several of the other buildings, are decorated with mountain scenes of Austria, by some of the best native artists. The theater is used for entertainments, balls and parties, but when not so used the audience or ball room—which is 2880 meters by 1600 by 1180 high—is set with tables where patients can order what they wish to eat or drink within the limitations prescribed by the physicians. Near the entrance is a large check-room with hooks and lockers. A gallery at the back provides a place for members of the staff and their families. On Sundays especially this building is popular, when it is difficult for patients to dispose of their time, and music is furnished all day. The best talent which Vienna has at her own theaters and opera-houses is brought here for the entertainment of the patients, and expense has not been spared to make this building and its purposes an important feature in the working of the institution.

To the rear of the Administration Building, on either side of it, are two observation buildings or pavilions where every patient is kept twenty-four hours before it is decided to which building he shall be sent. One of these is for men and one for women, and each is provided with a private kitchen where steam can be turned on and milk or other food heated in a few minutes at any time, day or night. Besides the wards there are a few separation rooms, which are not different from those in most modern hospitals of to-day, being well-ventilated and lighted, and each has a toilet. Patients, after examination and bath, are put into bed in one of the wards of five to eight beds, or in a separate room containing one bed. These pavilions are so arranged that one side can be used twenty-four hours, then the other side; the first being thoroughly disinfected and cleaned. Each side has a small clinical laboratory.

The glass in all the buildings is designed by Professor Wagner. The panes are not all alike, but are cut in different shapes and iron screens on the outside follow the line of lead in the window frames. These fit so exactly the frame of the inside of the window that when the window is closed the frame of iron work is not visible.

Back of and above the theater is the kitchen, and above this, on the upper of the many terraces we have climbed and at the back of the little city, is a church capable of seating one thousand worshippers, built in the "New Style" invented by Professor Wagner. It is a dome-shaped building of white marble, with bronze columns and with copper, gilt or gold figures inside and out. To the left of the pulpit is a retiring-room, where epileptics or disturbed patients may be quickly taken to recover without disturbing the services. Doubtful cases are placed near this room. The font near the front of the church simply drips water, which does away with the insanitary bowl containing holy water.

The view from any part of the hospital grounds is superb, and from the church it is enchanting. In front and just below are the buildings, filled with life, where the work is done for reclaiming the mind which has, for a time or forever, lost its balance, its equilibrium. Raising one's eyes from this little city with its busy life of over three thousand people, one sees to the East, in the dim distance, the City of Vienna, and beyond it and to the South

can be seen the mountains Schneeberg in Hungary. Immediately to the South lies an extensive stretch of country containing many little farms and a group of military buildings, and still further toward the horizon a group of buildings where the poor of Vienna are—to put it mildly—luxuriously taken care of. To the West and North are the Satzberg and Galizinberg Mountains, so near that you feel you are almost in the heart of them. The lights and shadows on summit after summit of these hills are ever changing, and with the valley of the River Wiental and Wienerwald still nearer, presents a most restful view to the tired brain of a nervous patient.

The walls surrounding the grounds enclose land which would seem ample—for years to come—to take care of the growth of the institution, but the authorities have procured a great deal more land beyond these walls, extending through some delightful woods and taking in the summit of a very high hill to the Northwest. These woods are now open to certain patients, where they take long walks and get ever-changing views. Everywhere in the grounds below are flowers, hedges and trees, and between the buildings for the asylum proper and the sanatoria are planted a grove of pines which, after a few years, will entirely shut off these two sections from each other.

The location of the different buildings I will not describe, the plan accompanying this paper giving the arrangement. At present there are thirty-four pavilions, with twenty-two hundred beds. The distance between the patients' pavilions is about 35 to 60 yards laterally, 65 to 80 yards frontal, with considerably greater distance between the sanatoria buildings. The total number of sick rooms proper is five hundred and eighteen; cot rooms with one bed, 42 per cent; with two to eight beds, 31 per cent; with nine to sixteen beds, 27 per cent. The cubic space per bed is 24 to 67 meters in the hospital, and much more in the sanatoria. Many of the rooms have the old-fashioned Dutch stoves. The farmhouse contains rooms for forty-three patients employed in farming. The building devoted to hydro- and electro-therapy and the Zander apparatus is the most perfectly equipped building of the kind I have ever seen. In this building are some baths and rooms for rest; also a swimming-tank, 69.4 meters. In the center of this building is a large

recreation room, and on each end a walk, the one on the east being laid with colored tiles especially arranged to educate the locomotor ataxia or tabes patient to walk better. The west room is mainly devoted to private baths. The rooms are laid in tile, and in many of them the tile extends to the ceiling. The sun- and air-baths are on the top floor.

The kitchens, one in the sanatoria, the other back of the theater, contain the most perfect arrangements that can be found at the present time. The rooms have tiled floors, with majolica tiles to the ceiling. Nineteen large circular cooking tanks are situated in the center for boiling vegetables and meats. Large gas stoves with a dozen covers or more, for general cooking, are placed near the center; all this different apparatus being placed in groups at considerable distances from each other, allowing for further installation when needed. In the south end of the rooms are large coffee boilers, the coffee being cooked by steam furnished from the general plant, the heat causing a vacuum which when created draws the hot steam and water through the coffee into the receptacle, where it may be drawn fresh for the patient. This is much after the French way of making coffee. To the left of the coffee-machines is a large and beautifully-appointed gas grill, and further to the left a large roasting-stove where wood is used, the roasts being put on spits or forks on which they turn automatically before the fire, the juice falling into pans below. Several roasts, one above the other, may be cooked at the same time.

In an adjoining room are solid white marble tubs four feet square, with hot and cold water running through them, which are simply used for washing potatoes, which are then placed on grates in an upright oven where they may be roasted or they may be cooked by steam. Each oven contains twenty to forty grates. Another room is devoted to pastry and bread making. Another to washing and the sterilizing of dishes. Refrigerators and store rooms occupy a goodly portion of one end of the building.

On the north side of the kitchen is a long row of warmers or ovens where food, when cooked, is placed ready to be sent out. In front of these warmers is a little railroad track, and during meal hours little electric cars are continually arriving and going to their different buildings with the food, which is kept hot in these as well as in the warmers.

The larger kitchen is near the center of the group of buildings; the smaller, for the pay patients, is to the west. Most of the cooking apparatus is of copper or nickel. Outside the larger kitchen is a sunken court where the patients are allowed to peel the potatoes before they go into their elaborate bath. All the rest of the preparation of vegetables, and cooking the same is done by paid employees.

The different pavilions are built with careful consideration for the class of patients which they are for: the curable, the incurable, the half-quiet or nervous, the restless or noisy, the violent, the dangerous and the criminal.

Along the upper terraces are large pavilions three stories high, for the tubercular patients, each pavilion having ample ground for the exercise and recreation of its own patients. Again, the pavilions where the excited, the restless and the epileptic patients are assigned have their grounds or yards enclosed by a high wall, where the visitors to the hospital may not disturb or excite them by watching or talking to them. The pavilion in the rear of the group is for chronic and supposed incurable cases and for the complete segregation of the incurables; by thus avoiding the discouraging presence of those poor hopeless souls it is felt that much more can be done for the curable cases.

The stimulating presence of convalescing patients is not considered seriously enough in many of our hospitals. I have been amazed at the want of tact in this respect in many of our private sanitoriums, where no account is taken of the discouraging thoughts or feelings of new patients when they are thrown in contact with chronic dements. The new patient so often asks the physician if they will be like these poor hopeless mortals.

To the extreme east is the Laboratory Building, which is the most completely equipped building of its kind in the world. To the north of this building is a morgue, a mortuary and a chapel. To the north of this again is the stable and automobile garage, so finished that it can be flushed with water and kept perfectly clean, and a power plant and incinerating plant. Still further to the north is a building for nurses and employees, of whom there are about six hundred. The laundry near this building is also tiled, both floors and walls to the ceilings, and contains centrifugals for

drying, and most of the machinery is automatic. I noticed the mangles were made in Cincinnati, Ohio. One room is devoted to the assorting of soiled linen, which can be flushed with water, as can all the rooms. The capacity of the present laundry and kitchen is for three thousand, with room for enlarging. The electric tram connects the kitchen and also the laundry with the patients' pavilions, and it is so arranged as not to be objectionable or even prominent.

To the extreme north of this set of buildings is a large conservatory, and to the west of the conservatory are six hundred fruit trees, which had been planted when I was there. North of these fruit trees is a piggery, which building is numbered "60," and has a capacity of two hundred. These piggery houses may be flushed the same as the stable. No cows or sheep are kept, but milk and beef are furnished by contract and examined frequently in the laboratory. To the west and southwest of the conservatory, on the outside edge of this group of buildings and I should say at least one-half mile from the main entrance, is a building for the criminal insane, who are kept by themselves in quarters suited to their different classes.

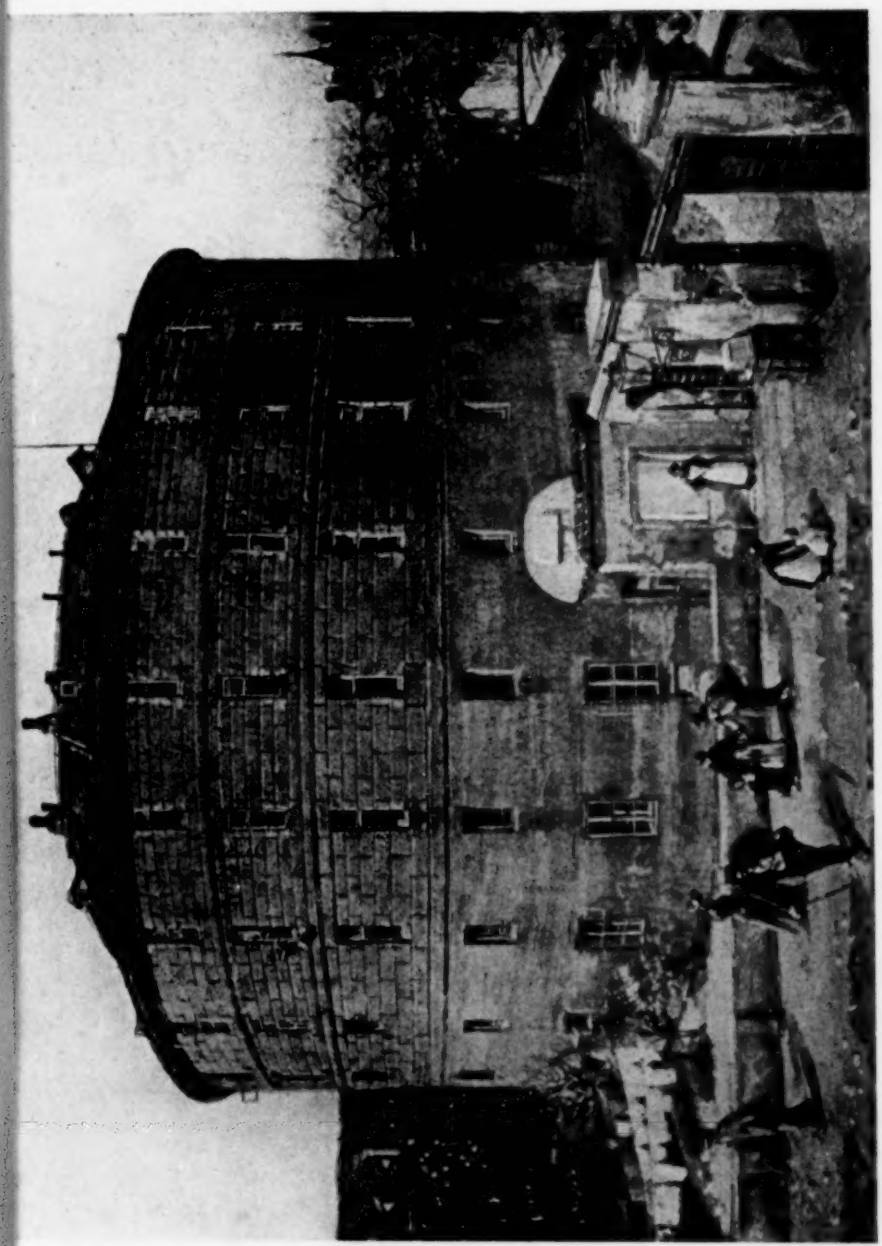
In every building occupied by patients are rooms, well-lighted and ventilated, 6 x 12 or 14 feet, with tiled walls, ceilings and floors, and with rows of hooks where patients' clothes, boots and shoes are taken to be brushed—no brushing at all being allowed in the wards or rooms. At the extreme west portion of the grounds are the sanatoria buildings, with accomodations for 350 in-patients, who can afford to pay $2.00 to $4.00 a day. The rooms are divided for first- and second-class patients, the first paying a little less than $4.00 a day and having separate rooms, bath and toilets; the tubs and fixtures being set in tile and marble throughout. They also have separate reception-rooms, beautifully furnished in excellent taste. The floors are well-covered with Persian rugs, and each room furnished as nearly as possible to suit the tastes or temperaments of various patients; some are in bright colors for the "fair and young," as the director informed me; others with colors toned down; and others perfectly plain.

The second-class have a bath less elaborate, and do not have rooms entirely to themselves. They pay a little less than $2.00 a

day. The furniture in the first-class is covered with silk or satin; in the second, with leather. Occupation treatment is a feature, and modern methods in every line of treatment are here used. The patients of the sanatoria have the greatest amount of personal liberty. The system of low pressure central steam heating has been adopted, and electric light and electric ventilators are used throughout. There are pavilions for the staff, for the police and the post office.

It is the purpose of the asylum, particularly of the sanatoria, to take men and women of all nationalities from any quarter of the globe, and on the staff are physicians who can speak the languages of most of the larger countries, and the physicians speaking the patients' language are assigned to them.

Before closing this description, I must speak of Fedor Gerényi, to whom, more than anyone else, the successful building of this large asylum is due. He directed all the work from the beginning to the end, spent his days on the ground, and a few days before the Emperor was to open the hospital he was not too busy to take me in his carriage to every building, and through the most important ones, explaining the most minute details and showing me much attention besides, although it took a good part of three days for me to inspect this plant. The work he is doing for the public institutions of Vienna cannot be too fully appreciated.

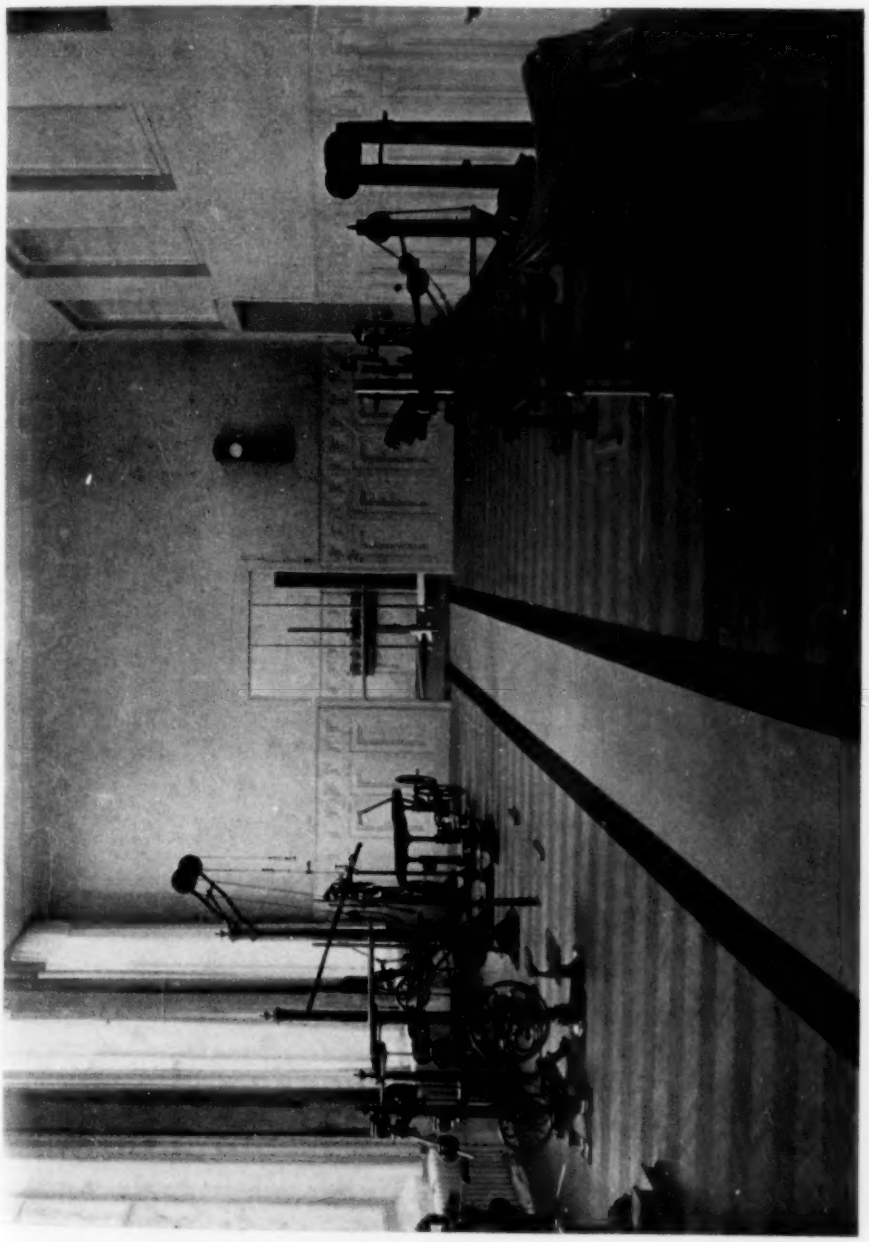


DER IRRENTURM IN WIEN. BUILT 1760.

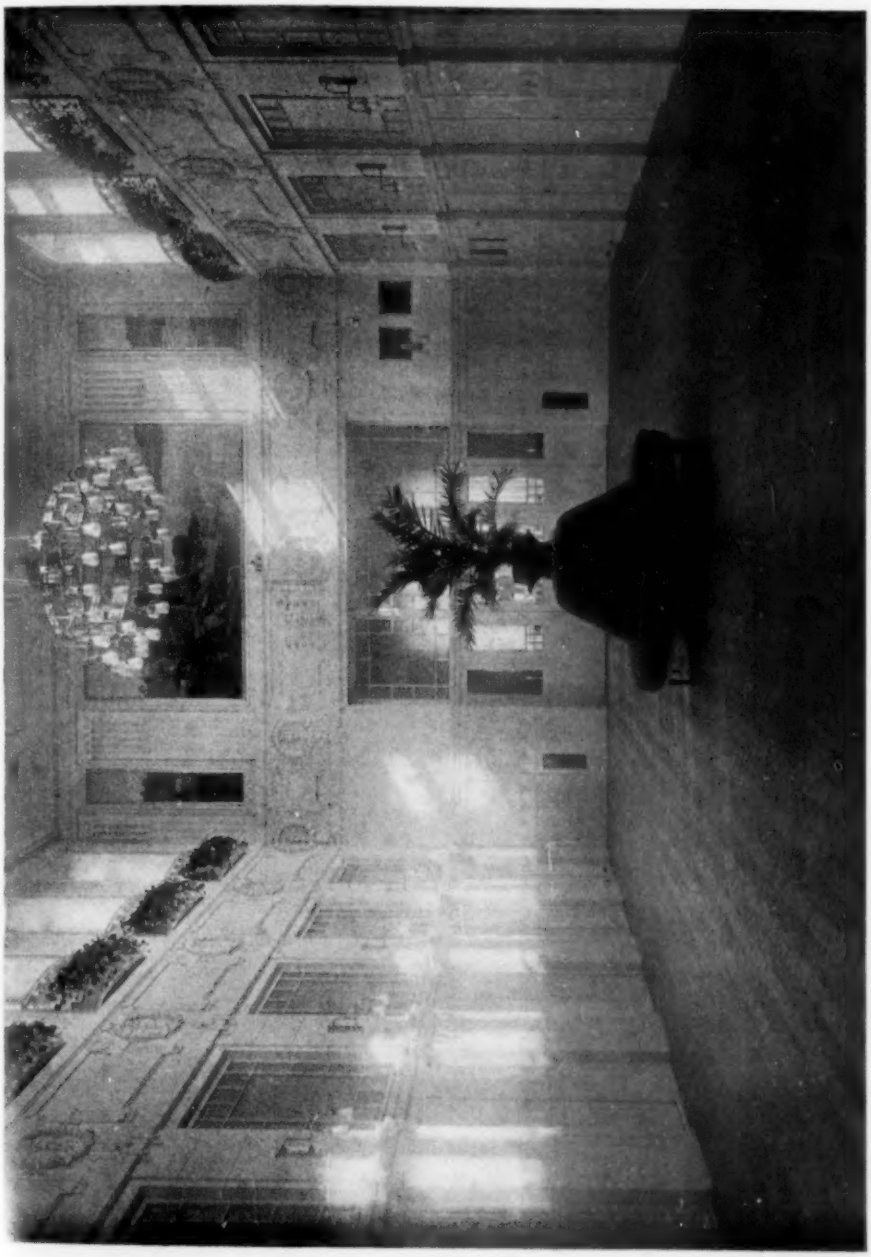
CORNER OF RECREATION HALL AND THIRD CLASS PAVILIONS.

VIEW OF THE CHURCH AND THIRD CLASS KITCHEN.

CURE HOUSE (FOR HYDRO-, MECHANO- AND ELECTRO-THERAPEUTIC TREATMENT.)



MECHANO-THERAPEUTIC ROOM.
VIEW TO THE GYMNASTIC ROOM.



CURE HOUSE. ROOM FOR GYMNASTIC MOVEMENT AND RECREATION.

SUN BATH.

SUN BATH.

THIRD CLASS PAVILIONS.

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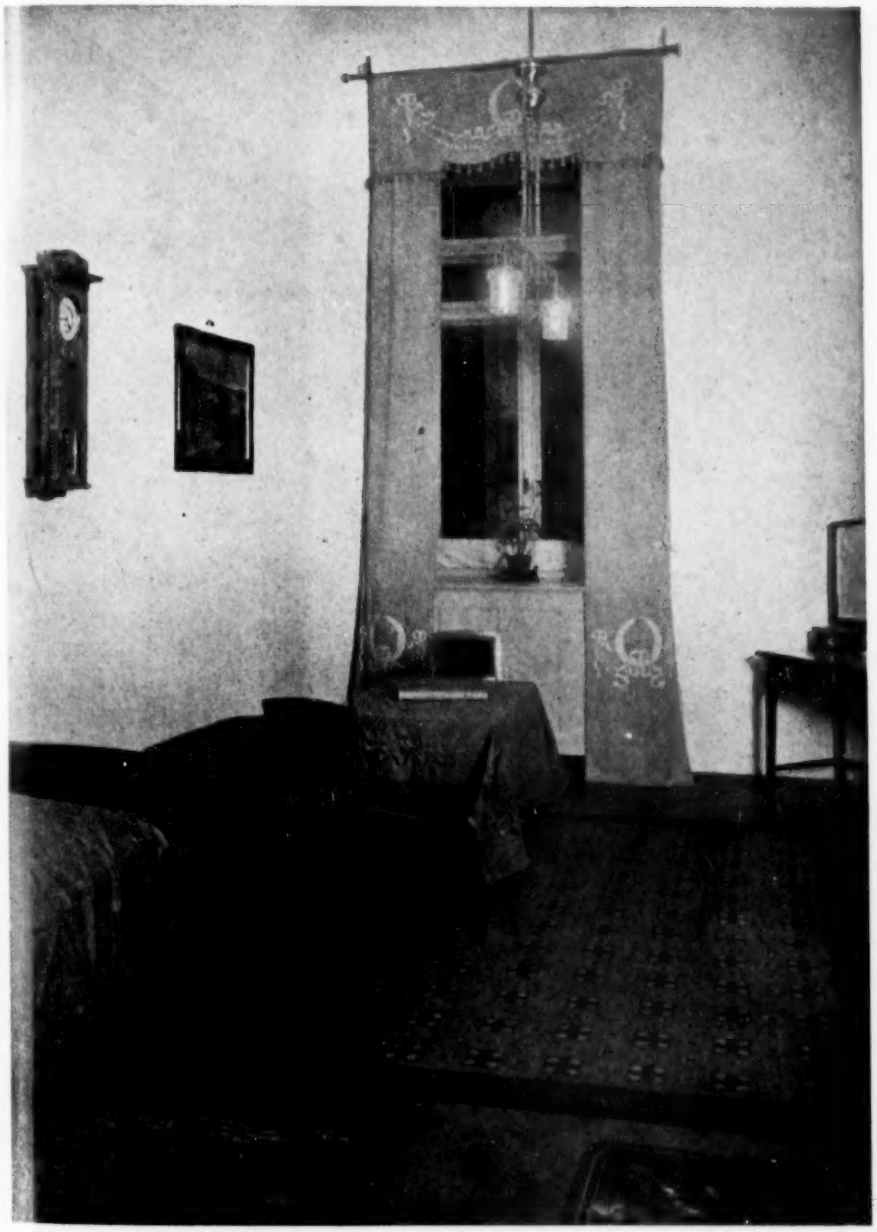
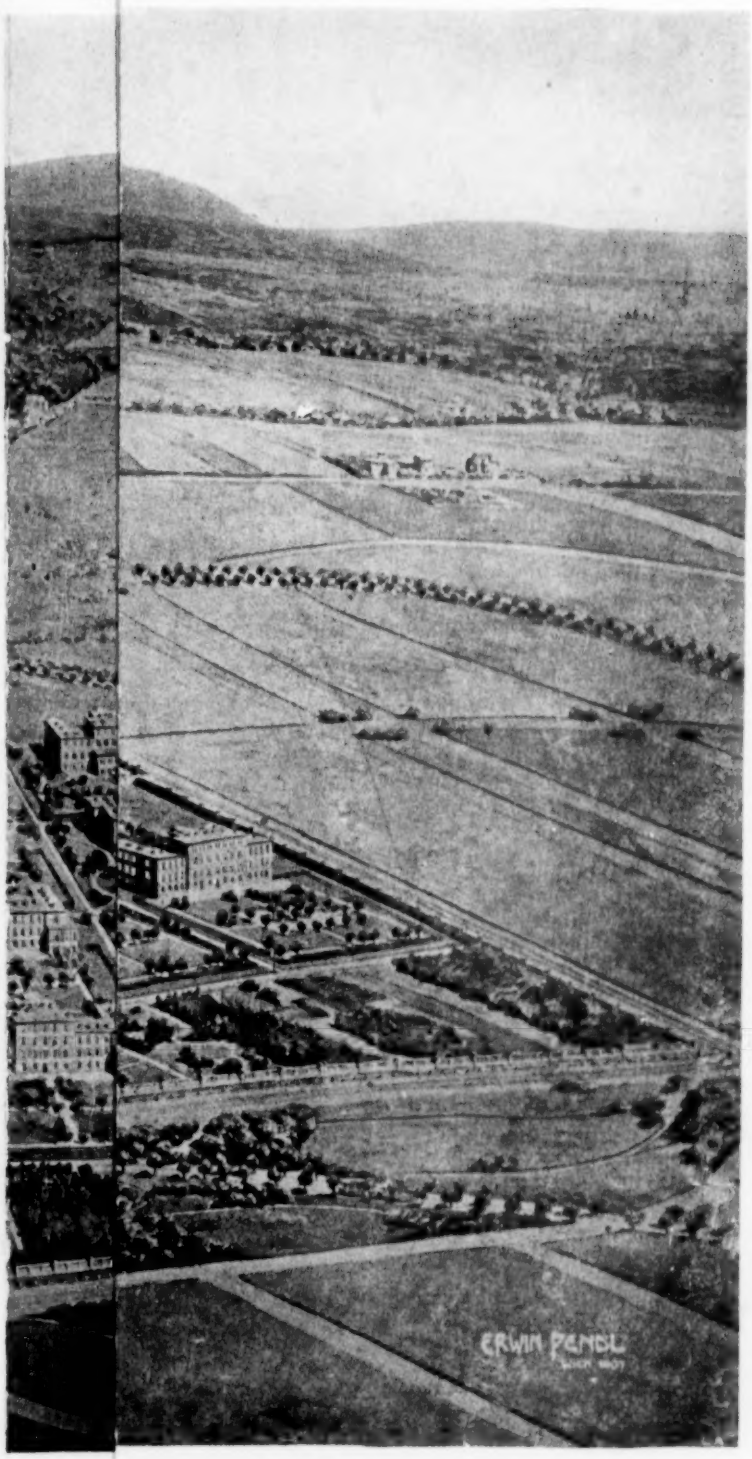


FIRST CLASS ROOM IN SANITARIA.

TUBE



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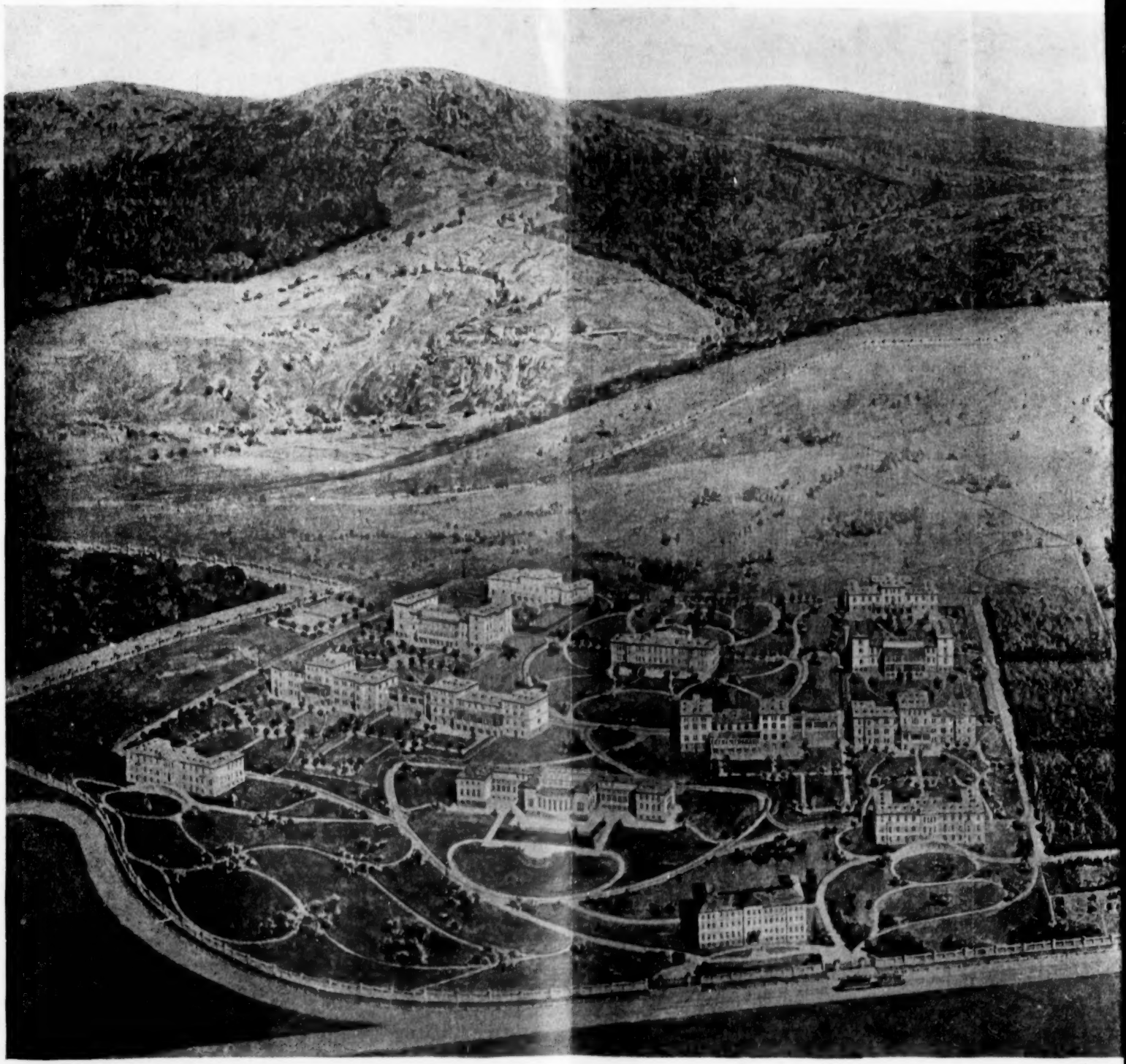
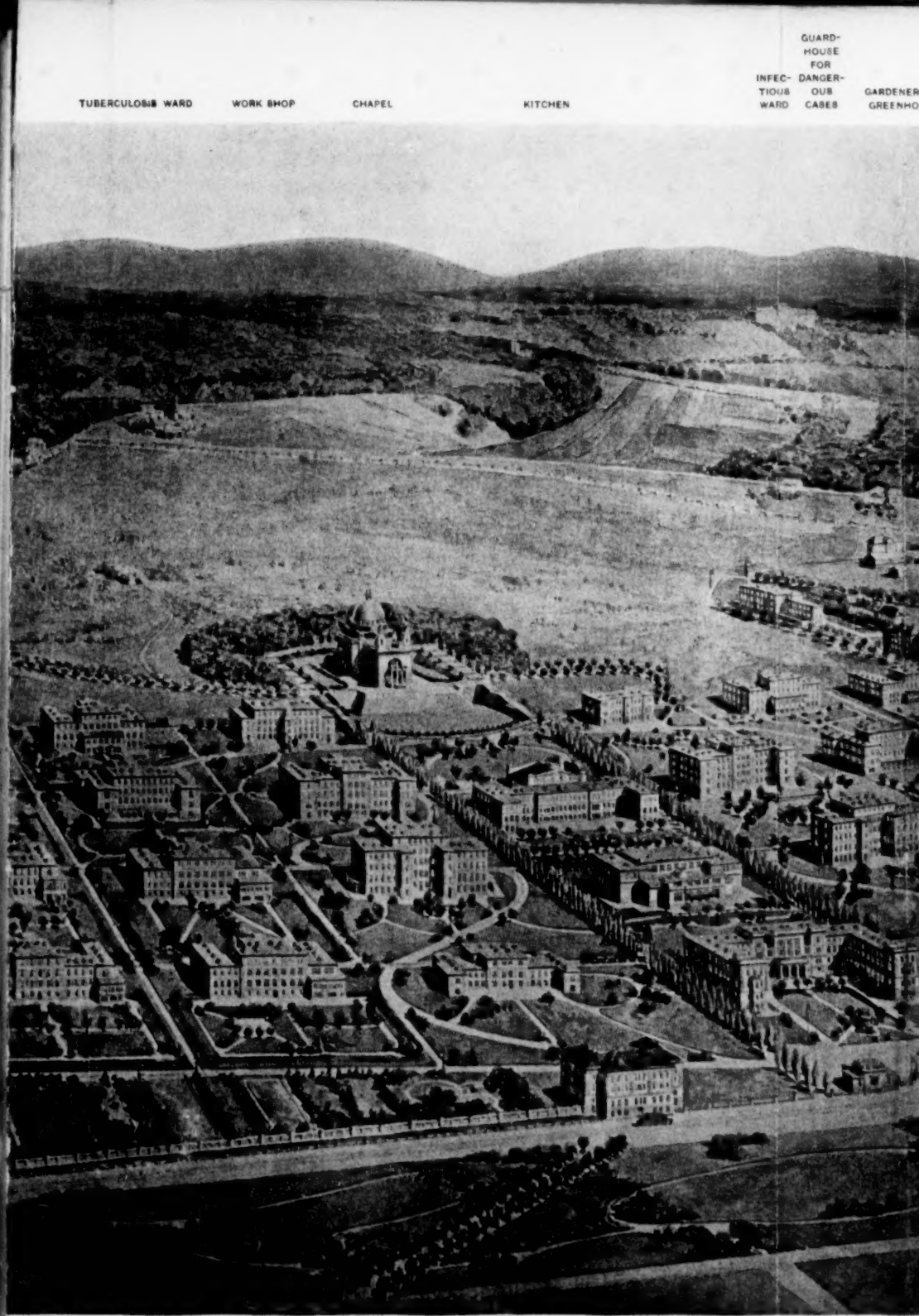
OSPITAL AN


CHRONIC WARD
KITCHEN
OPEN WARD
DIS-TURBED WARD
RECEP-TION AND SEMI-DIS-TURBED WARDS
HOSPITAL
ADMINISTRATION PRIVATE WARDS
OPEN WARD



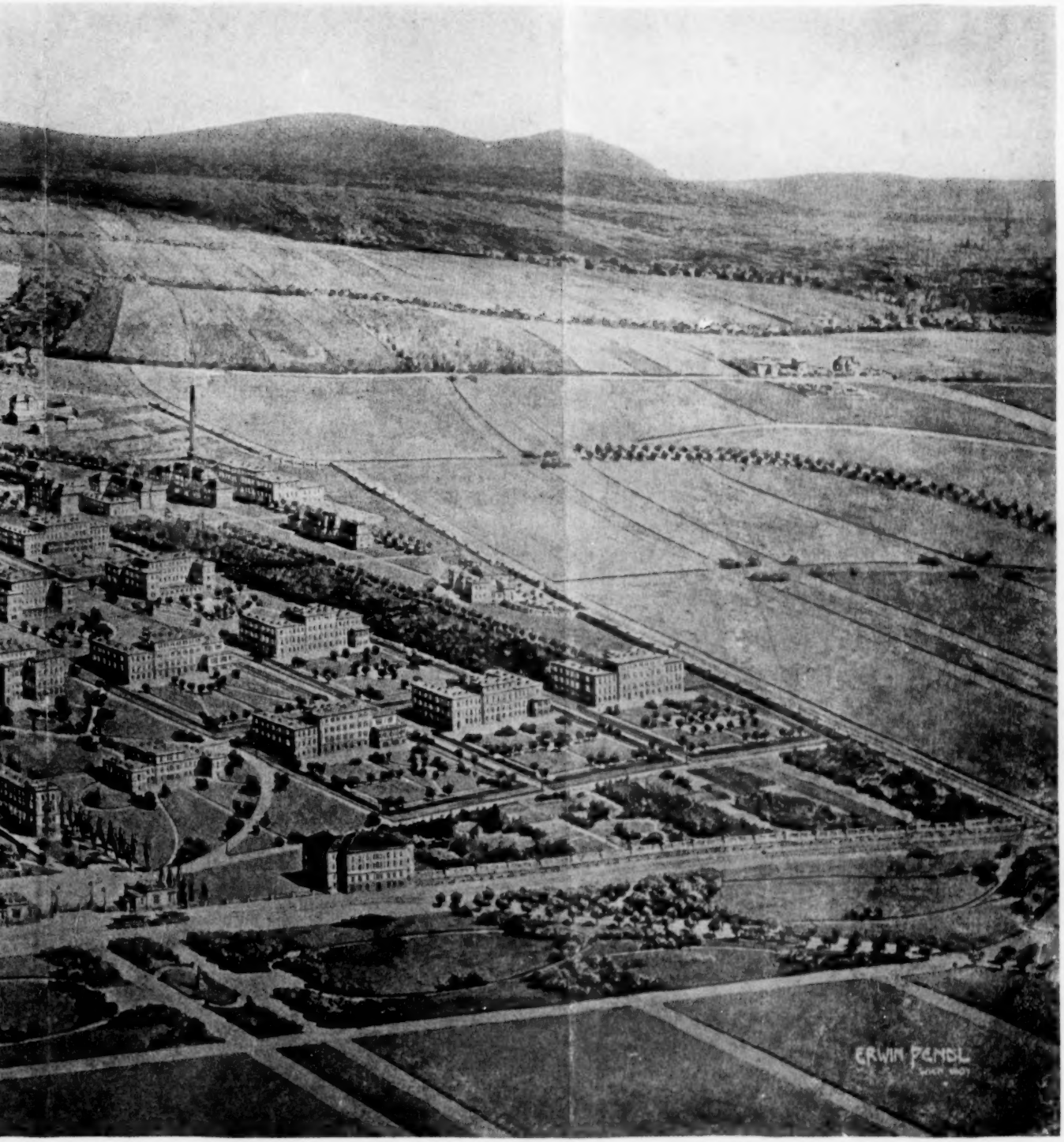
OSPITAL AND SANATORIA IN VIENNA FOR MENTAL AND NERVOUS PATIENTS OF LOWER AUSTRIA

GARDENER AND GREENHOUSE

POWER AND LAUNDRY GROUP

STABLES

MORGUE



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ITALIAN IMMIGRATION AND INSANITY.*

By ALBERT WARREN FERRIS, A. M., M. D.,
President of the New York State Commission in Lunacy.

The first meeting of the Italian parliament was convened in Turin in 1861 and Victor Emanuel was proclaimed King of Italy; but Rome and Venice were still under the control of the enemy, and Cavour died in that year. You may reckon the existence of United Italy from that date, if you choose; but "Italy free" was not an accomplished fact until Jules Favre, foreign minister of France, withdrew the French troops from Italian soil and the King, entering Rome, was left in sole control on September 20, 1870.

An amalgamation of many different peoples cannot be accomplished in one generation; scarcely in two generations. Florence, with all her beauty, could not accomplish within the span of our own lives the unification of the Italian peoples. Rome, with all her grandeur, could not compel rapid homogeneity of race in the land which music calls her own.

In the days of Hannibal, Carthage was a regal city, set upon a fertile soil, with a population of 700,000 boasting the prestige of local naval supremacy, controlling Sardinia, Sicily, Malta, Corsica and the north coast of Africa, profiting from the returns of rich argosies engaged in trade with Spain, Britain and the Baltic countries, with enormous income from a trade with the interior of Africa, and enjoying a certain wealth that seemed to assure her ambitious citizens a continuous prosperity. Yet she cut down her forests and suffered the devastations of war, and the former powerful rival of Rome dwindled into insignificance. To-day the site of Carthage is marked by the habitation of a few hundred struggling Arabs.

Not so Italy. The storm of the French Revolution broke in 1792 and Napoleon, four years later, entered Italy and "let loose

* Read at the sixty-fourth annual meeting of the American Medico-Psychological Association, Cincinnati, Ohio, May 12-15, 1908.

the dogs of war." She has been partitioned repeatedly by hostile forces. Taxes and tithes have been wrung from her by rapacious conquerors. Greed and avarice have combined to drain her very lifeblood. Yet she is emerging rapidly from the gloom of oppression and in another generation is destined to resume the occupation of recording a brilliant history such as was written for centuries before.

One-tenth of the territory of the country is barren rock. One-third consists of mountains. The destruction of her forests has rendered her soil dry and comparatively unproductive. Yet terraces have been formed by patient labor, and earth has been gathered and conserved, gardens have been constructed and the unconquerable spirit of the Italian people has asserted itself until the sheer force of their industry, perseverance and shrewdness compels the admiration of the world.

Metternich once said: "Italy is nothing but a geographical expression." By this he meant that it is a name given to a territory in which live several groups of distinct peoples, with almost tribal differences. The student or traveler of to-day receives the same impression. Thus it becomes necessary, in describing Italy and the Italians, to consider separately North Italy and South Italy, as distinct countries with distinctive inhabitants.

Some of our Italian immigrants come to us from provinces of North Italy—from Genova of Liguria, Bologna of Emilia, Udine of Venetia, and Pesaro of Marches. By far the greater number comes from the southern provinces, notably Napoli, Caserta and Avellino of Campania; Chieti of Abruzzi; Campobasso of Molise, and Reggio di Calabria; while many Sicilians sail hither from Messina, Catania and Palermo.

Not only are there differences in manners and in character, but there are marked physical, really ethnical differences. In the North there is more activity in industrial pursuits and the Northerners are more generally progressive. A keen interest is evinced in political education and in social questions. There is a greater advance in the accumulation of wealth, in the extension of trade and in education. An examination of recruits for the army revealed a percentage of 14.98 illiterates among the Piedmontese and of 18.42 among the Lombards. The Piedmontese

and Tuscans are excellent landlords; they use chemical fertilizers to enrich the soil and they pursue successful dairy farming. The men are all tall and strong. The Northerners show the persisting influence of former Austrian rule.

In the South, on the other hand, are found the results of the corruption and cruelty of the Spanish and Bourbon rulers of the olden times. The South is wholly agricultural and is poor. Many of the men are undersized and apparently ill-nourished. The social and political questions of the day are viewed with apathy. There is less advance in trade or education than in North Italy. The proportion of illiterate recruits from the province of Napoli was 51.57 per cent, from Sicily of 55.04 per cent. There has been in the past greater tendency to crime. Nine times as many murders have been reported in Sicily as in Venetia or Lombardy. Taxes fall rather heavily on the agriculturist and less money has been spent for purposes of education, of railways and of public works.

Brigandage, however, originally a political movement, later a powerful alliance of criminals for robbery or murder, no longer exists. For many years it survived as an expression of poverty and of hatred of the landlords, and until a decade ago was maintained in some localities simply for revenge and robbery in the form of the Mafia or the Camorra. The present system known as the Mafia levies toll on farmers, wine-growers and orange-growers, murders those who resist, and in rare instances influences judicial decisions and public contracts. Camorra, flourishing only in Naples, was an organization of thieves and dishonest people of the lowest class. Formerly its members levied tolls on trade and professions.

In the Southerners there is an Albanian and Greek inter-mixture, and in Sicily and Sardinia the Arabic blood is strong. This fact accounts for the remarkable differences in physique, temperament and characteristics of northerners, southerners and islanders.

Italy is said to average as cold as England; but the warmer weather in the South is an alleged reason for the decrease of steadiness and for the increase of laziness and passionateness one notices in traveling from Central to Southern Italy.

In the time of the Bourbons and up to about 1850, Southern nobles have been described as ignorant, overbearing, lazy and cor-

rupt. They absented themselves at Rome and Palermo; they were spendthrifts, and excited an evil influence in politics; they were hated by the peasantry with a few shining exceptions. In the cities the youths of the wealthy class of those days secured little education, passed their time in driving, hunting, traveling and spending money, and showed a rooted aversion to work. Professional men were very poorly remunerated. A large number of government office-holders received mere subsistence.

Why should not the peasants of that time have been unhappy and resentful? Their soil was nearly exhausted, they had little or no farm machinery. They raised wheat, corn, wines, olive oil, oranges and lemons. They had few cattle in the South and little pasture. For greater safety, they dwelt in villages frequently on hilltops and walked miles to their work. They were half starved, ill-clad. They knew the meaning of misery. In the interior of Sicily at that time the greatest poverty was found, and the people were far from provident. The petty accumulations of months were often spent on a single feast day. The irregular day laborer was the most miserable. He dwelt in a rude hut and suffered from absentee landlords, yet he did not resort to drink. The lapse of over a half-century has made an astounding difference. The conditions I have described have absolutely disappeared; but they undoubtedly left their impress and were responsible for certain characteristics of the Italian people. The most remarkable fact in connection with this matter is that the Italians were not crushed by such circumstances. They emerged patient, courageous, industrious and hopeful. In fact, Southern Italy has contributed a large percentage of the professional men, art critics, painters, philosophers and patriots of late years.

Two prominent industries have been the sulphur mines and the marble quarries. In Sicily, men and boys, all peasants, labor in the sulphur mines, with little return because of the primitive methods employed and the falling price of sulphur. The miner (*picconiere*) works six to seven hours a day for five days in the week, at forty cents to sixty-five cents per day. The *carusi*, or carriers, boys of seven to eighteen years old, stagger out of the headings with 70-pound loads from seven to eight hours a day, each having been leased by his parents to the miners for $10 to $60,

which sum is worked out slowly under frequently brutal task-masters. The miners are ignorant, quarrelsome, deficient in moral sense and prone to gambling.

The quarrymen, on the contrary, who labor in the mountains in the province of Massa in northern Tuscany, are stalwart specimens of manhood, careless and extravagant, somewhat turbulent and restless and fond of adventure.

In the North and certain other parts of Italy among the newer industries are the manufacture of silk, linen and cotton; ship-building, sugar beet raising; and the manufacture of steel goods, locomotives and electrical machinery. Among the people engaged in trades and regular occupation thrift and frugality are noticeable.

For long years the taxes constituted a heavy burden; and they so continued under the old policy of the Bourbons. The State, until about two decades ago, took about thirty per cent of one's income. There was an income tax and a family tax; a tax on horses, carriages, servants and dogs. While saddle horses went free, the peasants' donkeys were taxed. The poor were the greatest sufferers, for how could an agriculturist, earing sixteen cents to twenty-nine cents a day (or in the South, eight cents to ten cents a day and his lodging) afford to pay a tax? All this is changed to-day and now the taxes are levied in accordance with the English law; they fall heaviest on the owners and landlords.

The peasant's foods must needs be simple. He has a bread made of Indian corn (*polenta*) or of wheat. He has no meat. He has beans, celery, radishes, fruit, a little salt fish, bacon, frogs and snails. The majority of laborers live on *polenta* and macaroni only. Butter is rare in the South. So many suffer from inadequate food that the government a year ago proposed to provide extra food, for the school children in the village of Vercelli in Piedmont, as an experiment, in the hopes that the race might thereby be improved in stature.

Several families occupy one room, dress in rags, and yet are cheerful. In the South one sees castles surrounded by hovels, with donkeys, cattle, pigs and human beings in close proximity. There is no poor law, yet there are many splendid private charities for the infirm, insane or infants, especially in the North.

There is a great deal of sickness among the peasants. Cav. Dr. Antonio Stella, of New York, is authority for the statement that while prevalent among Italians in America, tuberculosis is almost unknown in Italy except where imported by returning emigrants. Malaria is the worst scourge. It was reported a few years ago that eighty per cent of the Southerners are exposed to it, and that 20,000 died annually in Basilicata, Calabria, Maremma and Sardinia. The reclaiming of the Pontine Marshes is resulting in great improvement in the death rate of Southern Italy. The peasants are driven by malaria into the town; but they prefer town life. They have strong attachment for the house or home, and for their native village. They take little interest in sanitary conveniences, bathing once or at most twice a week, when well-to-do; otherwise only in the months of July or August. In the cities the poor live in crowded quarters in large tenements, without ventilation. In Naples many live in damp cellars, several families together, fostering disease, filth and vice.

Italians at home are prolific, the birth rate being nearly the highest in Europe, and parents are very fond of their children. Burly and apparent rough laborers are gentle and tender with the babies. But in this country, in the second generation, owing to the work the women do in the shops, or stooping over sewing machines, and also owing to venereal disease, absolute sterility or one-child sterility is common.

Women are respected. There is little sexual immorality among the Italians. Family ties are properly regarded. A married woman or engaged woman will not be seen in the company of any but her own man. In the South travelers tell us the women are much like Mohammedan women. They are uneducated except as regards the kitchen, the linen closet, the children, and the work of the fields. The high sense of honor among Italian men in respect to women is probably better preserved for the reason that there are practically no drunkards among the Italians, while there are no abstainers.

Religion is a primitive affair among the Italian peasantry. In South Italy there is a simple belief in miracles and mysteries, and a surprising amount of superstition. Fifty years ago the clergy were uneducated, and belonged largely to the low classes of

society. The average priest of that time mastered only reading and writing, and did not lead an austere or pure life. But a tremendous change occurred, and the enlightenment of Italy as shown to-day came largely through a new educated and devoted clergy.

The army is a great feature of Italian life. When on a peace footing Italy maintains a standing army of 330,000 men, and about 3,250,000 in time of war, recruiting by conscription from the able-bodied men from twenty to forty years of age. A few are in exempt classes. The discipline of army life has a very salutary effect in removing provincial differences and in cultivating order and self-control. Besides this, the recruits are instructed by their officers and profit much thereby.

An educational system is being elaborated by some zealous and able men, but is not yet entirely efficient. Parents find a way to evade the compulsory education law. However, the proportion of illiterates fell from 78 per cent in 1867, to 67 per cent in 1881, and to 36 per cent in 1896, in the South. In Venetia and Lombardy only 6 per cent of the children of school age are absentees, but in the South the figure is much larger. The proportion of the population attending schools in 1895 was 8.2 per cent, while the proportion in England at the same time was 17.5 per cent. The illiterary of Italian immigrants into the United States is 46 per cent, while that of German immigrants is less than 3 per cent.

We have thus examined hastily and generally the many factors that combine to influence or modify the physical and mental development of the Italian people who come to our shores, and have fairly weighed their temperamental and acquired mental traits. Now let us consider them as immigrants.

It is stated that 600,000 Italians immigrate annually into European countries, to Tunis, Egypt, South America and the United States.

The statistics of the Department of Labor of the State of New York obtained from the authorities at Washington show that the total number of immigrants into the United States from Italy during 1907 was 264,208, of which number 1809 were debarred, leaving 262,399 in the country, of which total probably 100 were returned after landing. Of these people 45,545 came from North Italy, including 4145 illiterates and 3418 who had been in this

country before. South Italy sent us 218,663 of whom 107,132 were illiterates and 13,546 had been in the United States previously.

Every year 160,000 return to Italy. This year 200,000 did so.

The Rev. Antonio Mangano tells us what reasons operate to send the Italians from home to-day. Mr. Mangano was educated at Brown and Columbia Universities, and is a Baptist clergyman in charge of a missionary chapel in Brooklyn. His articles on Italians in the publication "*Charities and The Commons*" are of much interest. He says that Italians leave home because of poverty, wretchedness and want; high rent; the indifference of absent landlords and the severity of agents; class distinctions; occasional failure of crops; comparatively heavy taxation; systematized repression; temptation of steamship agents; glowing tales told by returned emigrants; and the very laudable desire to rise in the world, to educate their children, and to become respected property-holders.

From the reports in the "*Bulletin*" of the National Department of Labor at Washington, by Emily Foote Meade, who made an exhaustive study of "The Italian on the Land" in this country, we must conclude that Italians have good instincts that are easily awakened, latent tendencies that only need opportunity, strength and resistance of fiber, imitativeness and adaptability and that they become desirable and useful citizens.

Into what occupations does the Italian immigrant drift, or what work does he choose, in this country? How much stress and strain are his portion in the first years of life in this new land? The occupations in which we usually see Italian peasants employed are the following: In the cities, they become day laborers, sellers of fruit, nuts and candy; dealers in coal, ice and wood; furnace men, caretakers of unoccupied houses, watchmen over new buildings, street cleaners; while others become shoemakers, plasterers, importers of fruit, florists, caterers, public officials, bankers, merchants of wine and oil and most efficient policemen. The women become factory hands and dressmakers. Of the garment workers in New York City, 95 per cent are Italian men and women.

In the country men become successful gardeners and farmers,

berry pickers; brick makers, glass polishers and general factory workers; mill hands, builders and contractors.

Mr. Severn, New York State representative of the Italian-Swiss Agricultural Colony, of California, states that next to Chinese labor, fruit growers find nothing equal to Italian labor. He corroborates the statement made by Elliott Lord in "The Italian in America," wherein a number of Italian fruit garden colonies scattered through New England as well as through the South and West are described. Lord shows that Italian colonists increase surrounding land values very materially wherever they settle.

About 1892 an Italian named John Carini went to South Glastonbury, Conn., in the employ of the New Haven and Hartford Railroad Company as an axeman to cut railroad ties. It is reported that at the end of two years he had saved enough money to purchase a farm and send to Italy for his family. The entire family worked upon the farm until it produced enough income to enable him to buy additional land, and to-day he owns 1500 acres, almost all of which is under high cultivation. He raises peaches, apples, plums, pears, grapes, small fruits and vegetables.

J. H. Hale, of South Glastonbury, is authority for the statement that the Italian cultivates successfully land which others find too difficult to use on account of rocks and stumps. The perseverance and the courage of the Italian in matters of agriculture are indomitable.

With the willingness to work at anything and with work to be had, there is no very severe pressure, no great confusion or difficulty experienced except in the coldest part of the winter. We should therefore not expect to see much mental alienation among the Italians in this country; and the fact is, there is little.

Of alcoholic intemperance I cannot make a definite statement illustrated with figures; but all reports are to the effect that there are remarkably few cases. As to epilepsy, its incidence among Italians in this country is practically negligible. Of 2450 epileptic patients received into Craig Colony for Epileptics, at Sonyea, N. Y., up to April 10, 1908, but 7 were born in Italy, and but 16 were born in America of Italian percentage.

Many of the figures quoted hereafter regarding the Italian insane were compiled by Dr. Thomas W. Salmon, formerly a phy-

sician in one of the New York State Hospitals for the Insane, and now an assistant surgeon in the U. S. Marine Hospital Service, at Boston, Mass. Of 100 immigrants certified for insanity at Ellis Island, New York City, where all the immigrants are inspected by U. S. Government and New York State alienists, 12 were Italians, 12 were Austro-Hungarians, 12 were Greeks, 17 were Russians, or Finns, 13 were English and 19 were Irish. Of 100 deported from public institutions 10 were Italians, 5 were Germans, 21 were Austro-Hungarians, 29 were Russians or Finns, 5 were English and 19 were Irish. The percentage totals of all arrivals that year were as follows:

Italians	28.8%
Germans	3.5
Austro-Hungarians	25.4
Greeks	2.0
Russians or Finns	19.6
English	3.7
Irish	2.6

This makes a very favorable exhibit for the Italians.

For the fiscal year of the New York State Hospitals for the Insane ending September 30, 1905, Dr. Salmon gives some very instructive figures, quoting from material collated by Dr. William L. Russell, Medical Inspector of the New York State Commission in Lunacy. The percentage of the whole number of foreign-born patients in these hospitals was as follows:

Italy	3.9%
Germany	25.9
Austria-Hungary	6.3
Russia and Poland	8.8
England and Wales	5.9
Ireland	36.0

The percentage of the whole number of foreign-born in the State of New York at the same time was:

Italy	9.6%
Germany	25.3
Austria-Hungary	6.9
Russia and Poland	12.4
England and Wales	7.5
Ireland	22.4

The ratio of insane to population was therefore as follows:

Italy	1 to 431
Germany	1 to 173
Austria-Hungary	1 to 199
Russia and Poland	1 to 249
England and Wales	1 to 209
Ireland	1 to 111

Before the " New Immigration " from Italy began, the proportions of the foreign-born insane in the State Hospitals was much as shown by Dr. Russell's statistics of Willard State Hospital, namely:

Italy	3.0%
Germany	26.0
Austria-Hungary	4.0
Russia and Finland	6.0
England	8.5
Ireland	43.0

The changed conditions are illustrated by Dr. Russell's figures regarding foreign-born admissions into Manhattan State Hospital in New York City, in 1905, namely:

Italy	6.5%
Germany	18.0
Austria-Hungary	14.0
Russia and Finland	13.0
England	3.0
Ireland	24.5

With vast numbers of Italians entering into the country since the " New Immigration " began in 1900, the ratio of insane Italians to the whole population in the United States is only 1 to 439; Austria-Hungary presenting 1 to 292 and Russia and Finland 1 to 380.

Dr. Salmon remarks: " In spite of the most effective inspection which can be derived, there must every year be admitted many immigrants already insane, and many thousands who are destined, under the unusual stress of the first ten years in the United States, to become insane." This statement, one must say on reflection, does not apply to the Italian immigrants.

There are dangers to be feared in the case of Italy. Her illiterates are a drawback, though they learn rapidly and the second

generation furnishes a satisfactory, if not an admirable, class of citizens. The idiots and imbeciles, the mentally defective and the constitutionally inferior whom we receive from Italy constitute indeed a menace.

It is probably a fact that practically all the able-bodied peasants of certain localities are now here in this country; but the statement is untrue that an effort is being made to aid the diseased and inferior who had been left behind in these localities, to come over also and share the advantages of this foster country.

Naval Surgeon Colonel A. Montano, of the Italian Navy, in the official bulletin of Italian immigrants published at Rome in 1907, makes the following report:

Number of cases of mental diseases found among Italian immigrants who came to North America or returned from North America to Italy during 1906:

NUMBER OF CASES COUNTED ON THE SHIPS.

	Bound for the U. S.		Bound for Italy.		Total.
	Men.	Women.	Men.	Women.	
Alcoholism	..	..	2	..	2
Mental alienation	..	..	23[1]	3	26
Dementia	..	..	9	3	12
Sensorial phrenosis	..	..	1	..	1
Melancholia	..	..	8	9	17
Acute mania	..	..	2	..	2
Persecution mania	..	..	5	..	5
Religious mania	..	..	1	..	1
Paranoia	..	1	4	..	5
Sudden alienation	1[2]	..	..	..	1
Total	1	1	55	15	72

On almost every vessel that carries Italian immigrants into or out of the United States a representative of the Italian Navy sails, charged with the duty of examining his fellow countrymen in the matter of all diseases that effect their physical or mental condition, and of reporting to his government at the time the ship reaches port. It is the desire of the Italian Government that sick, and especially insane Italians, shall not be sent out of the country.

Italy is caring for her poor and diseased at home. Italy is pre-

[1] One case committed suicide on board, cutting his throat with a razor.
[2] Jumped overboard and was drowned.

paring to enforce her compulsory education laws, to make effective her humanitarian schemes, to uplift her people at home.

Investigation reveals the fact that the Italian insane in New York State are recruited almost exclusively from the rosy, round, well-nourished vegetarian country people, who, after immigration into our country, settle in our large cities in close quarters, engage daily in long hours of in-door labor, and live upon a diet consisting largely of meat of bad quality. A year of such life works havoc with them.

The problem will be easily and immediately solved if we assist to suburban or, better, to farming localities the peasants from the country regions of sunny Italy.

It is our duty and our opportunity to join hands with the active, scientific and wise Italian organizations in New York City, the great entrance gate of this country; to enforce with no faltering hand the rules that must govern all immigration, and to co-operate with the Italian Government in making, as it now does, a careful selection of immigrants at the Italian ports of embarkation. Thus our country will receive a valuable class of desirable new citizens, unusually free from insanity or a tendency thereto.

THE IMBECILE WITH CRIMINAL INSTINCTS.*

By WALTER E. FERNALD, M. D.,

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In this paper, I shall briefly consider the class of imbeciles who as a part of their life history present certain persistent tendencies or repeated acts of a criminal nature. I use the term "imbecile" advisedly as an adequate synonym for the many different expressions used to describe various degrees of lesser mental defect, resulting from causes operating before birth or in early childhood, as contrasted with mental impairment or disease developed later in the life of the individual, like dementia præcox, epilepsy, etc. Cases of actual idiocy are also excluded from this discussion.

The term imbecility was formerly applied only to a class of persons presenting simple, obvious intellectual short-comings. The field of mental defect has been gradually extended and widened so that the time-honored definitions and classifications have become incomplete and obsolete. To-day institutions for defectives are often expected to receive patients where the intellectual defect is apparently only moderate, and the principal reason for institution treatment is the failure to harmonize with the environment, as shown by low tastes and associates. In other cases, the prominent symptoms are general incorrigibility, purposeless and needless lying, a quarrelsome disposition, a tendency to petty stealing, a propensity for setting fires, aimless destruction of property, a tendency to run away and lead a life of vagrancy, sexual precocity or perversions—these may be the symptoms which impress the parent or the physician.

The recognition and understanding of these and other less obvious phases of defect are largely due to the correlation of the results of the modern scientific study of normal psychology, pedagogy, degeneracy, criminology and sociology.

* Read by title at the sixty-fourth annual meeting of the American Medico-Psychological Association, Cincinnati, Ohio, May 12-15, 1908.

A brief review of the ordinary phenomena and symptoms of imbecility is necessary for the proper interpretation of the cases to be described. From a biological standpoint the imbecile is an inferior human being. If the mental defect is due to direct heredity or to developmental abnormalities of the central nervous system, having their genesis in the ovule or in fœtal life, the various anatomical, physiological and psychical stigmata of degeneracy are usually present. Indeed, in no other class of human beings are these various stigmata found so constantly, so frequently and so well-marked as in the congenital imbecile. If the mental defect is caused by traumatism, or acute local disease, or other causes operating at birth or soon after birth, the physical stigmata of degeneracy are often absent.

Some of the physical evidences of mental defect are as follows: abnormalities in the size and shape of the skull and cranium; in the size, shape and weight of the brain; variations in the size, shape and relative position of the ears; abnormalities in the form, situation, and structure of the teeth; protruding lower jaw; congenital deformities of the hard palate; pallor of the skin; scanty beard, etc.

Imbeciles of all grades exhibit in varying degrees certain well-marked mental characteristics. In mere memory exercises they may excel. They have weak will-power. The power of judgment is defective and uncertain, and often determined by chance ideas, not by the outcome of the past experience. Thought is scanty, limited mainly to daily experiences. They are unable to grasp and utilize the experiences of life.

Pronounced backwardness in ordinary school studies is, of course, a constant feature of the uncomplicated cases. At the end of his school life, at the age of 15 or 16 years, the imbecile may be able to read in the the third reader, to do simple addition and subtraction, and easy multiplication. Division is not often achieved.

Imbeciles are childish even in adult life. They make friends quickly and are cheerful and voluble. They are boastful, ungenerous, ungrateful. Notwithstanding their stupidity, they are cunning in attaining their own ends. They seem to have but little sympathy with distress or suffering. They are often cruel, espe-

cially to small children or weaker persons. They seem to take special delight in stirring up trouble and are often fond of tale-bearing.

They are vain in dress and love bright and gaudy colors. They like to be well-dressed, and are indifferent to cleanliness of body.

In actions and conversation their own personality always comes into prominence. They manifest unbounded egotism, leading to marked selfishness. Their whole life revolves around their own personal well-being and the possession of things desired.

They show little real affection for their relatives. Their affections are superficial and easily transferred. The mothers say, "They look at what I bring in my hands, and not in my face." Their letters consist mostly of a catalogue of senseless and useless things desired.

They are prone to lie without reason, and often lie unhesitatingly when truth would be to their own interest. They are inclined to steal.

They are morally insensible. As a rule, they are able to carefully differentiate in the abstract between what is right and what is wrong as applied to their personal environment, but in practice their ability to make these distinctions bears no relation to their actions and conduct.

They seldom show embarrassment or shame when detected in wrong-doing. I have never known an imbecile to exhibit traits of remorse. Correction or punishment is of little effect.

They revel in mawkish sentiment. They are susceptible to the emotional phase of religious expression. They are very apt to choose intimate companions very much younger than themselves, or persons very much beneath them socially or below them in the scale of intelligence. They are generally cowardly in the presence of actual physical danger. They are very susceptible to suggestion and are easily led.

They show marked physical insensibility. Galton says, "To the imbecile pain comes as a welcome surprise."

Few imbeciles have been seen to blush. They show an early craving for tobacco and alcohol. They are proverbially lazy and fond of idleness. They seem incapable of forethought.

Imbeciles of both sexes usually show active sexual propensities and perversions at an early age.

There are two traits common to all imbeciles with few exceptions. One is that they will cheerfully risk severe punishment for the sake of some slight gain which appeals to their personal desires. The other is that they seem unable to apply themselves continuously in any one direction. The imbecile often becomes skilled in some one line, perhaps in some branch of a mechanical trade, but unless under the closest supervision, he will not apply himself to the work which he is perfectly capable of doing well.

The above generalizations apply to a very large number of the imbecile class. Many of these symptoms and tendencies may be appreciably modified or suppressed by suitable environment and training. The expression of these tendencies is varied according to sex, age, state of physical vigor, opportunity, etc.

The cases to be reported were selected from the 1236 patients now in the Massachusetts School for the Feeble-minded. They include various degrees and types of defect, from cases bordering on actual idiocy to so-called " borderline " cases, where the mental impairment is slight compared with the moral and social deficiencies. Some of these cases now in adult life have been in the school continuously since early childhood. Other cases at large in the community until the time of puberty were then sentenced to the Reform School by the criminal court and thence transferred to this school. Others were referred to the school from the community without an actual criminal court record.

In many cases repeated acts of a criminal nature have been committed in the community. In other cases the persistent criminal tendencies have been expressed only as modified by institution conditions, but I have no hesitancy in classifying these " criminals who have actually committed no crime " in this group.

The tendency to promiscuous and precocious sexual vice, common to all types and degrees of imbecility, is considered only as incidental and corroborative evidence.

Case I.—F. M., female.

Age when admitted 18 years. Personal history very meagre and nothing known of ancestry. It is known that this patient has been a prisoner at the State Industrial School, at Sherborn prison, and in various jails and houses of correction. She was a State ward and was placed out in families several times, but always absconded after the theft of money and other articles. The experienced court officer who brought her to the school

stated that in her language and in the freedom with which she discussed her various escapades, she was "the most brazen and depraved human being he had ever seen." She gloried in her misdeeds and unblushingly related stories of her various adventures. At times she shamelessly revealed her sexual propensities. She stole everything she could get her hands on. She was wantonly destructive of property. Even attempted violence toward her attendants. Showed ability as an organizer and as an inciter of rebellion and mischief.

Degenerative stigmata: Supra-orbital ridges prominent. Zygoma prominent.

Present age 22 years. Reads in 4th reader. Is fond of books and magazines. Expresses herself fluently and well. Adds and subtracts slowly to 20. Cannot multiply 4 x 5. No division. Patient is childish in her ideas and tastes. Conceited and egotistical. Sly and cunning in small things, but shows lack of caution in concealing her serious lapses in conduct. Kind to children. At several periods has shown a marked infatuation for patients much her inferior mentally, and who were, in fact, of a very low grade of mentality. She has never chosen as her particular chums, patients of her own grade. Easily influenced by people of whom she is fond, and is scrupulously loyal to her special chums. She is selfish and ungrateful. She is always in sympathy with any evidences of rebellion or insubordination. At first was quite slovenly and careless in her work. Of late, she has become more particular, and to-day, with close supervision, is quite the equal of the average seamstress. Without supervision the quality of her work at once becomes poor.

Case II.—J. C., female.

Age at admission 17 years. Paternal grandfather and grandmother both insane. Father and mother not up to the standard mentally. Mother had convulsions to age of six years. Patient dishonest, untruthful, destructive. Could not apply herself in school work. Liked to play with younger children. Had convulsions in early childhood. Wet bed until 14 years old. Showed no remorse when detected in theft. Would tell lies without any apparent reason. Was at "George Junior Republic" for a while. Says she was "in jail" there almost continuously for lying, stealing and general incorrigibility.

Degenerative stigmata: High, perpendicular forehead. Receding chin. Small mouth. Ears badly made, with adherent lobules. Teeth badly placed. Face markedly asymmetrical.

Can read in 4th reader. Likes to read story-books and magazines. Penmanship good. Uses language intelligently. Adds and subtracts by hundreds, and multiplies by two or three figures. No division. Patient is childish, deceitful, boastful. Likes to tell stories of her connection with men and boys, although her family say these stories have no foundation in fact. Likes to change from one thing to another, but does fairly good work under supervision. Likes to be well-dressed, but has to be forced

to wash neck and ears. Forms violent attachments towards other patients. Chooses very defective patients for her chums. Indolent, untidy. No affection for relatives. Gloats over her misdeeds. No shame or remorse. Shows absence of motive by stealing things for which she has no use.

CASE III.—F. S., female.

Age when admitted 16 years. Colored. Committed to State Industrial School when 14 for stubbornness and violence towards brothers and sisters. In a fit of jealousy tried to kill baby brother. Mother was ugly tempered and quarrelsome. Girl wet bed until 16 years old. Had attacks of irritability and violence during which she walked about aimlessly. Always incorrigible. Ordered out of public school at age of 12.

Degenerative stigmata: Prominent zygoma. Face asymmetrical. Ears gross, with adherent lobules, and exaggerated details.

Present age 22. Reads easily in 4th reader. Likes to read newspapers, books, and magazines. Slow of speech, but expresses herself well. Handwriting admirable. In number work can add slowly to ten, but not above that. Can tell time by five-minute intervals. Patient is vain, fond of dress, and of ornament. Selfish. Exceedingly proud of whatever she does herself. Disobliging, stubborn, often sulky and rebellious. Shows no affection for relatives. Has attacked other patients and attendants in fits of temper, brought on by failure to get her own way. Can do beautiful laundry and other work, but will not do it unless very closely supervised. Sexual pervert. Her indecent actions with other patients are carried on regardless of the presence of others.

CASE IV.—M. B., female.

Age at admission 15. Mother intemperate. Father in prison on charge of assault and sexual connection with this girl and an older sister. Persistent thief and liar. Sexually precocious.

Degenerative stigmata: Deep orbit. Face asymmetrical. Ears asymmetrical, with adherent lobules. Palate high-vaulted. Teeth badly placed.

Present age 17. Reads in 3d reader. Likes to read story-books. Uses language expressively and fluently. Adds and subtracts sums in three figures, and multiplies by two or three figures. No division. Can tell time by five-minute intervals. This patient is selfish, conceited, egotistic, indolent. Lies habitually with no motive. Sly and cunning in attaining her own ends. Selfish and grasping. Very ungrateful in every way. Has been taught to do good work under supervision. Will not work if not watched. Deceitful, unreliable. Silly and childish in her behavior and actions. No modesty. Steals things for which she has no use. An inciter of mischief and insubordination. Loves to talk of crimes and criminals. Referred to school by criminal court after persistent habits of thieving, etc.

CASE V.—K. N., male.

Age when admitted 11. No family history. No personal history previous to admission.

Degenerative stigmata: Bushy eyebrows, meet in center. Heavy supra-orbital ridges. Deep orbits. Ears crinkled and dissimilar in shape and position. Face asymmetrical. Palate high-arched. Very deaf.

Present age 21. This patient was in school classes from the time of his admission until he was 18 years old. He is now able to read fairly well in 3d reader. Reads newspapers and magazines intelligently. Has a good vocabulary, and uses language understandingly. Can add numbers to 10 accurately, but cannot subtract these numbers. Cannot subtract or multiply. Patient is vain and boastful. Excels in athletics and likes to exploit his athletic prowess. He is contemptuous in his comparisons of his own doings with those of his companions. Very egotistical. Profane and obscene. Lies unblushingly in securing his own desires. A cruel practical joker. Is wantonly cruel to smaller boys and to his associates. Steals anything he may desire. Shows good intelligence in many directions. Absolute disregard for the rights of others. Greedily reads the newspaper accounts of crime and criminals and boasts of the crimes he would commit against property and persons if he were at large. Is an inciter of mischief. Industrious and capable in all forms of ordinary work under close supervision.

Case VI.—C. X., female.

Age when admitted 16 years. Was abandoned by parents at an early age. Says mother was intemperate. Patient had an illegitimate child when she was 14 years old. Committed by criminal court to State Industrial School for theft and incorrigibility.

Degenerative stigmata: Very high cheek bones. Deep orbits. Face markedly asymmetrical. Ears asymmetrical, with adherent lobules.

Present age 24. Reads well in 3d reader. Good command of language. Adds and subtracts in hundreds; multiplies numbers of two figures. No division. This patient can do first-class table-waiting and other forms of domestic work when closely supervised. If not supervised does very poor work. Has keen sexual propensities. Forms violent friendships for girls much less intelligent. Chatters and giggles endlessly in a simple way. Very deep and cunning in carrying out her own schemes. Is tyrannical to weaker people. Cruel to animals. Harsh to young children. Very neat in dress and person. Very vain, ungrateful, selfish. Lies unblushingly. Will run the risk of losing some much-desired pleasure for some small gain. Never shows signs of remorse for wrong-doing. Skims through the paper each day for accounts of crimes and murders. Her general behavior is that of a child of 11 or 12.

Case VII.—N. C., female.

Age when admitted 20. Father intemperate; mother epileptic. As a small child, patient was untidy, played with children younger than herself, was cruel to animals. When 13 years of age was committed to State Industrial School for fornication and assault. Had been incorrigible previously.

Degenerative stigmata: Ears large and gross, with adherent lobules. Astigmatism. Prominent supra-orbital ridges. Deep orbits, prominent zygoma. Face asymmetrical.

Present age 27. Reads well in 4th reader; handwriting legible; adds and subtracts slowly to 20. No multiplication or division. Can tell time by five-minute intervals. Patient is loud and assertive in manner. Always puts herself forward. Has a great opinion of her own ability. Sly and cunning. Fond of dress and jewelry. Domineering and overbearing towards others. Shows no affection towards relatives. Quick tempered and violent at slight provocation. Can do good work but will not stick to it unless closely supervised. Masturbates. Sexually perverted. "Oversexed." Becomes sexually excited when men are around. In the institution environment these propensities are usually kept under control, with occasional outbreaks of temper and sexual disturbance. She unwillingly does under supervision the work of a rather inefficient domestic.

CASE VIII.—X. E., male.

Age at admission 16. Colored. Committed here at instance of criminal court. Has record of having been before the court repeatedly for incorrigibility, destructiveness, stealing of money, etc. Rachitic and undersized.

Degenerative stigmata: Receding forehead. Prominent supra-orbital ridges. Prominent zygoma. Ears small, dissimilar and with indistinct details.

Present age 21. Patient reads well in 4th reader. Enjoys reading magazines, etc. Handwriting is admirable. Adds correctly to 20, but is uncertain in adding numbers above 20. No subtraction, multiplication or division. This patient is a vain, bombastic egotist. Has a great opinion of everything he has or does. Is neat and tidy in dress. Sly and cunning. Lies without hesitation. Steals. He is a trouble-maker and inciter of mischief. Polite and courteous in his manner and use of language. Has learned to do excellent work as a house painter, but if not closely supervised is very careless and slovenly about his work. Will not work continuously without supervision.

CASE IX.—S. U., female.

Age when admitted 17. Father intemperate; has prison record. Patient illegitimate, although father still lives with mother of girl. Neither father nor mother can read or write. At age of 14 patient was committed to State Industrial School for theft and incorrigibility. In court, she testified that the father had committed incest with her, and accused the mother of venally using her for lewd practices. She was placed out from the Industrial School repeatedly, but always with the history of sexual irregularities and theft at each place.

Degenerative stigmata: Has deep orbits, prominent zygoma, ears asymmetrical and poorly proportioned with adherent lobules.

Present age 33. Can read in 3d reader. Reads simple story-books, but shows poor understanding of what she reads. Cannot spell. Uses language intelligently. In number work, can add a little under ten; no subtraction or multiplication. Can tell time by five-minute intervals. Patient is childish, selfish, disobliging. Fond of dress but careless about her personal cleanliness. Fond of music and dancing. Sly and cunning. Is an habitual liar and thief. Is inclined to be stubborn and sulky. Can do beautiful laundry work if closely supervised, but if supervision is withdrawn, does very poor work. Chooses younger and less intelligent companions.

CASE X.—K. I., male.

Age when admitted 7 years. No family history. Illegitimate. When admitted could not read nor write. Wet bed. Mischievous and sly.

Degenerative stigmata: Skull asymmetrical. Forehead lined with heavy transverse wrinkles. Face asymmetrical. Ears show adherent lobules.

Was in school continuously from time of admission until 18 years old. Now 32 years old. Is an omnivorous reader. Reads newspapers, magazines, books and literature of all kinds. Reads scientific reports, agricultural hand-books, etc. Has not a very clear appreciation of what he reads. Expresses himself well. Can add, subtract, and multiply up to 100. Can divide mentally with an easy divisor. Has a vast fund of miscellaneous information. Has a good memory for facts and events, and is especially good at remembering the exact dates of important events at the school in his time. He is an inveterate liar. In an apparently innocent way tells malicious falsehoods which he knows will make trouble. He is boastful and likes to be prominent. He loves to stir up trouble and mischief. Will tell a new patient that he heard the doctor say that the boy's father is dead, etc. He has been detected in perverted sexual actions with other patients. Occasionally runs away and leads a vagrant life for a week or ten days, when he returns to the school of his own accord. He is never in sympathy with the officers who have him in charge. Once attacked an attendant with a knife. Urges other patients to attack officers. Is always sly and cunning in his mischief-making, and always seems prejudiced against the constituted authorities as a matter general principle.

CASE XI.—F. Q., female.

Age when admitted 16 years. No bad heredity. Unhappy home conditions. Patient always high-tempered, jealous and hard to get on with. Always desirous of attracting attention. Untrustworthy. Lied about everything. An inveterate thief. Stole money and small articles repeatedly. When accused, lied glibly, and when detected in falsehood or theft showed no signs of sorrow or shame. Would repeat theft at next opportunity. Cruel to little children. Was precocious sexually and had no reserve about exposing her person or in her language or behavior with men or boys.

Degenerative stigmata: Face asymmetrical. Ears asymmetrical in shape and size. Adherent lobules.

Age now 17. Reads in 4th reader. Fond of novels, magazines, etc. Handwriting good. Uses language intelligently. Adds and subtracts slowly to 20 only. No multiplication or division. Patient shown about the same characteristics as noted at time of admission. She lies and is deceitful. Fond of dress, boastful and indolent. Will do good work if closely supervised, but if not supervised is very careless.

Case XII.—N. M., female.

Age when admitted 18 years. Father intemperate. Mother 48 when patient was born. Patient committed from State Industrial School. Had court record of fornication, street-walking and repeated thefts. Had been repeatedly placed out from the Industrial School with the invariable history of promiscuous sexual intercourse, frequent running away, and several arrests for street-walking. Was a chronic thief, often stealing things for which she had no use.

Degenerative stigmata: Prominent supra-orbital ridges. Prominent zygoma. Deep orbits. Prominent chin. Good ears, but with adherent lobules. Face asymmetrical.

Present age 24. Reads easily in 3d reader. Fond of reading and likes magazines and story-books. Uses language easily and well. Can add and subtract in hundreds. No multiplication or division. Patient is childish and easily led. Noisy and boisterous in daily life. Obliging and anxious to please. Marked sexual propensities and unable to control herself when men are around. Masturbates and has perverted sexual relations with other patients. Sly and cunning, but shows little real foresight. Capable of doing good work, but is slovenly and careless unless closely supervised. Was formerly a great inciter of mischief and a trouble-maker, but during the last year has "settled down" and grown much more tractable and industrious.

Case XIII.—T. Q., male.

Age when admitted (October, 1907) 16 years. Parents Russian Jews. No bad heredity. Patient was committed here as an alternative to being sentenced in police court for stealing money from his employer. States that he has stolen money repeatedly in places where he was employed. At time of his commitment here, there was a warrant out for his arrest for rape committed on a young girl. He claims that this rape was committed as the result of a "dare" by some of his associates.

Degenerative stigmata: Skull asymmetrical. Hair grows low on forehead. Eyebrows bushy and meet in center. Heavy supra-orbital ridges. Ears asymmetrical and unevenly placed. Teeth dark, discolored and crowded in jaw. Teeth at irregular angles, cuspids parallel with bicuspids. Face asymmetrical.

Reads fluently in 3d reader. Spells well. Good handwriting. Can add to 20, but cannot subtract, multiply or divide. Can tell time by hours but

not by minutes. This patient is frank about his escapades and describes them freely. Says he found it very hard to do school work. Rather stupid and heavy but with fair understanding of ordinary affairs. Memory as to times and places very uncertain. Apparently an uncomplicated case of imbecility.

CASE XIV.—X. E., male.

Age when admitted 18 years. Mother feeble-minded, Father unknown. Boy illegitimate. Was committed to the school as an alternative to being sentenced for rape committed on a young girl. This was the third time this boy had committed rape. Had repeatedly stolen money and other articles, and had committed assaults on boys who bothered him.

Degenerative stigmata: Hair low on forehead. Heavy supra-orbital ridges. Eyebrows bushy and meet in center. Deep orbits. Ears asymmetrical and badly made. High-arched palate. Face asymmetrical.

Present age 21. Patient had been in public school continuously up to time of his admission here, but is able to read only simple books like the primer. Cannot spell simple words; can write a little; knows nothing of number. Cannot tell time. In using language is able to express himself well. Has a large fund of general information. This patient is extremely talkative; very pompous in manner and language. Vain of his personal appearance. Neat in dress and person. Is a persistent and senseless liar. Is rebellious and contrary with new attendants. Has attacked several attendants without provocation. On general principles is opposed to those in power. Masturbates, but is not a sexual pervert.

CASE XV.—N. T., female.

Age at admission 16 years. Father moral pervert in every sense. Mother confesses to having lived with many different men. Brother of patient has a history of incorrigibility and multiple court record. Patient had fits of temper as a child. Learned to talk late. Wet bed. Stubborn, wilful, passionate, and "could not tell right from wrong." Liked to play with younger children. Cruel to other children. Immediate occasion for commitment was result of being brought into court for incest with father. While patient was with mother on vacation two years ago, she became pregnant and gave birth to a child.

Degenerative stigmata: Large supra-orbital ridges. Receding chin. Receding forehead. Prominent zygoma. Palate very high and narrow. Ears asymmetrical.

Present age 21. Reads easily in 3d reader. Writes good hand. Can add in hundreds; subtract slowly under ten; no multiplication. Can tell time. Expresses herself fluently and intelligently. Patient is indolent, cunning; has no sense of shame. Quarrelsome. Exceedingly crafty in gaining her own ends. Has attacked other patients and attendants with knife without provocation. Had no love for her baby and manifested no real grief when it died. Becomes sexually excited when men are around.

CASE XVI.—O. L., female.

Age when admitted 14 years. Father and mother both intemperate and degenerate, and always on the verge of pauperism. Patient admitted here from Tewksbury Almshouse, with history of incorrigbility. Cruel to animals, etc. Had put a cat on a red-hot stove. Had thrown knives and stones at playmates. Said she would like to have a small baby to strike and kick. Very untruthful and a chronic thief.

Degenerative stigmata: Eyebrows bushy. Zygoma prominent. Face asymmetrical. Nose small and rudimentary. Ears badly shaped, with adherent lobules. High palate. Teeth crowded, and placed on different planes. Low forehead. Body small and undersized.

Present age 16. Reads in 4th reader. Uses language easily. Can add a little under 5. Can tell time. This patient is sly and cunning. Vain and boastful. Fond of teasing. Has fits of temper when she screams, tears clothing and pulls out her hair. Likes to attract attention and is very vain of her personal appearance. Is in a state of chronic rebellion against the constituted authorities, a trouble-maker and inciter of mischief. About two years ago this patient, with another patient, drowned a fellow-patient in a bath tub.

CASE XVII.—K. I., male.

Age when admitted 17. Irish-American. Family history unknown. Patient walked at 18 months, did not talk until 7, could not learn in school. Had convulsions in first year. Began use of tobacco at age of 8. Referred to the school from the criminal court, where he was held on a charge of rape committed on a young girl. Had worked for several years in a factory. where he carried goods from one part of the factory to another.

Degenerative stigmata. Very prominent supra-orbital ridges. Face asymmetrical. High palate. Ears prominent and outstanding.

Present age 18 years. Reads easily in 4th reader. Poor speller. Adds to 10, but cannot subtract. Typical imbecile of medium grade. Happy-go-lucky fellow. High tempered. Works well under supervision; idle otherwise.

CASE XVIII.—Q. K., male.

Age when admitted 9. No family history. Peculiar from early infancy. Has always been nervous.

Degenerative stigmata: Face asymmetrical. Eyeballs protruding. Eyes widely spaced. Deep orbits.

Present age 11 years. Beginning to read easy sentences in primer. Cannot spell, except 3-letter words. Can add to 5 fairly well. Cannot tell time. Patient very troublesome and incorrigible. Has a bright, knowing and intelligent manner. Has a fund of general information, and seems brighter than he really is. Talkative. Has used tobacco since an early age. Very cruel to smaller children. Has ungovernable temper. Is a malicious liar. A very successful inciter of discontent and rebellion among

the other patients. Is most ingenious and convincing in his falsehoods. Inveterate thief. No appreciable motive for his bad behavior.

CASE XIX.—J. E., male.

Age when admitted 13 years. Parents of Irish descent. Father not very strong mentally. Patient eighth child in a family of 14. Seven children have died, 3 still-born, 1 hydrocephalic. Patient committed to the school after being before the local court repeatedly for incorrigibility, theft, destruction of property, etc.

Degenerative stigmata: Skull of microcephalic type and asymmetrical. Ears dissimiliar. Nasal septum deviated. Palate high-arched.

Present age 15 years. Reads well in 2d reader. Spells simple words. Can add to 15 slowly and rather uncertainly. Cannot subtract or multiply. This patient is one of the most incorrigible boys I have ever known. He lies persistently, purposelessly and maliciously. He is a great thief. Very impatient of control. Wantonly destructive. Cruel to other children. Vain, conceited, quick-tempered, insolent. Very fond of tobacco which he has used since he was 8 years old. Absence of motive characterizes many of his actions. Works well under supervision.

In every case with a court record, and in the cases from the reform schools, the offence for which the patient was originally committed was not a first offence, but was the climax of a long series of petty misdeeds which finally became unbearable. Probably all this group were committed by the police courts without question as to their mental condition. In several cases it was only after the patient had been "placed out" to service several times, from the reform school, and had repeatedly failed to respond favorably to good environment that it was realized that mental defect was the underlying cause of the delinquency.

A large proportion of the cases described well represents the class of cases who formerly would have been considered merely as criminals, with no thought of mental defect.

By reason of early incorrigibility or bad home surroundings many of these cases had few school advantages in childhood. In court their mental deficiency was probably mistaken for ignorance from bad inheritance or lack of opportunity.

Nearly every case shows either no family history obtainable—which in the case of a child usually means a dubious heredity—or a positive history of bad inheritance.

Nearly every case presents various physical stigmata of degeneracy in skull, ears, face, teeth, palate or physiognomy. All of the

cases described are in the period of adolescence or early adult life, and yet only a few present the usual comeliness of feature and physical attractiveness usually shown at this period of life.

All of these patients boast of their evil acts and eagerly discuss the criminal experiences of a new-comer. They gloat over newspaper stories of crime and shame. They delight in "yellow journalism." They reveled in the exploits of Tracy the desperado and of Thaw the assassin.

Of the cases described, none seem able to apply themselves continuously in any one direction, even for a greatly desired reward. Even the brightest were unable to master more than the merest rudiments of arithmetic.

The patients described vary greatly in general intelligence, and in the amount of definite knowledge which they have acquired, but they greatly resemble each other in their childish tastes, excessive vanity, unreliability, aggressive boastful egotism, selfishness, moral insensibility, fondness for malicious mischief and trouble-making, indolence, willingness to run great risks for the sake of some small gain, untruthfulness, lack of shame and remorse, lack of sympathy, etc.

The cases described fairly represent the criminal imbecile type. I have no doubt as to the actual imbecility and the resulting moral irresponsibility of every one of these cases. As a group, the female cases especially well illustrate the so-called "high-grade imbecile." In fact, the physical and psychical stigmata exhibited by this group of imbeciles, selected because of their criminal tendencies and acts, are merely the usual signs and symptoms found in the ordinary case of imbecility, modified only in *degree* and not in *kind*.

This class of borderline cases with criminal tendencies now constitutes a troublesome and puzzling factor in our institutions for the feeble-mided. They are often malicious, deceitful and inciters of mischief and insubordination. They have a wonderful power of suggestion over their simple-minded fellow-patients. They are generally committed to the institution against the wishes of their parents. The efforts of their friends to obtain their release are constant and perplexing. If a case of this description is taken before the Supreme Court on a writ of habeas corpus it is

more than likely that the patient will be released. Indeed, it is not difficult to find reputable medical men who would testify that the case " is by no means a fool," and that he ought not to be deprived of his liberty. It is evident that clinical types and shadings of mental deficiency have become familiar to the alienist which have not yet been so definitely formulated and classified as to be readily recognized by the profession generally. It is equally true that the legal definitions and precedents pertaining to ordinary cases of imbecility are inadequate when applied to these high-grade imbeciles. We have, therefore, to face the anomalous fact that it is easy to have a class of patients committed to our institutions who are promptly discharged by the higher courts because these lesser types of deficiency have neither been adequately formulated medically nor recognized legally.

The diagnosis of borderline cases of imbecility is simplified if it is possible to obtain the family history and the personal history of the patient, with special reference to the period of infancy and early childhood. Even in the cases with very slight mental defect there is usually a history of delayed dentition, late walking, delayed speech, relatively long continuance of untidy habits, and very likely a history of convulsions as part of the history of the first few years of life.

The public school history of the patient is almost always illuminating. As a rule these cases do not compare at all favorably in their school work with the average child. It is seldom these cases are carried beyond the standard of third-grade work. Difficulty in understanding simple arithmetical abstractions is very significant. The presence or absence of various degenerative stigmata is significant.

Selfishness, moral insensibility, willingness to run great risks for slight possible gain, childish tastes, lack of affection for relatives —all these are significant symptoms. A very constant symptom is inability on the part of the patient to apply himself continuously either in school work or in any other occupation without constant supervision. In some cases with only slight intellectual defect, the inability to " make good " socially will be a deciding factor in the diagnosis. In a given case the age, sex, social condition, physical health, school advantages, etc., have a distinct bearing on the interpretation of the case.

Some of the cases reported were considered as typical cases of so-called "moral imbecility" without intellectual defect, until long observation and close analysis demonstrated that they were cases of *true imbecility,* where the anti-social tendencies of the ordinary imbecile were exaggerated to such an extent as to overshadow the presence of intellectual impairment, and the existence of the characteristic physical, mental and moral signs of congenital mental defect.

I have never happened to see a well-marked case of so-called "congenital moral imbecility" which did not exhibit many, or indeed most, of the significant stigmata of *true* imbecility.

With the moral imbecile the stock of showy and superficial knowledge, the confident and boastful manner, the glibness of tongue, the spurious brightness, the cunning and carefully planned schemes—all these serve to mask the significance of the supreme selfishness, the lack of shame and remorse, the unbounded egotism, the absence of adequate motive, the cruelty, the lack of fear of consequences, the lack of judgment, the love of notoriety, the failure to keep a situation, the failure to respect the feelings of relatives, the abnormal social re-actions, the idleness and tendency to early vice, which are so apt to characterize this type of defective.

Kraepelin admirably describes the modern conception of "moral imbecility" as follows:

"Moral imbecility represents a form of mental weakness which includes chiefly the realm of the feelings. It is characterized by the absence or weakness of those feelings which inhibit the development of marked selfishness. The intellect, as regards matters of practical life, is moderately developed; patients apprehend well; they are able to accumulate more or less knowledge, which they use more or less for their own advantage; possess a good memory and show no defects in the process of thought. They do, however, lack the ability to obtain general viewpoints, to perform any work of a high-grade, and to form an adequate conception of life in the outer world.

Morally their lack of sympathy is manifested from youth up in their cruelty towards animals, their tendency to tease and roughly use playmates, and an inaccessibility to moral influences. They develop the most pronounced selfishness, lack of sense of honor, and of affection for parents and relatives. It is impossible to train them because of the absence of love and ambition. They tell falsehoods, become crafty, deceitful and stubborn. The egotism becomes more and more evident in their great conceit, bragging

and wilfulness, their inordinate desire for enjoyment, their violence and dissipation.

* * * * * * * * * * *

They are incapable of resisting temptation and give way to sudden impulses and emotional outbursts, while the susceptibility to alcohol is especially prominent."

So-called "moral imbeciles" frequently commit the most heinous and revolting crimes. The boy Pomeroy was a high-grade imbecile who had been accepted for admission to the Massachusetts School for the Feeble-minded when he committed his notorious crimes.

Every imbecile, especially the high-grade imbecile, is a potential criminal, needing only the proper environment and opportunity for the development and expression of his criminal tendencies. The unrecognized criminal is a most dangerous element in the community. The fact that the high-grade imbecile often excels in one or more lines—music, painting, some limited branch of mechanics—is misleading. Maliciously mischievous children, runaways and vagrants, the incorrigibles, disorderly and ungovernable children, are often of the imbecile type. Lighter grades of imbecility often fail of recognition in early childhood, but as soon as some unusual situation arises demanding discretion and decision of action, and self-control, the mental, moral and social incapacity becomes evident. The mental incapacity becomes more evident in youth and adolescence as contrasted with the rapid mental development of their playmates.

The juvenile expression of this slight degree of imbecility, especially in children watched and guarded in good homes, is trivial and harmless. The reaction of these patients to the temptations of adolescent and adult life is another matter.

The life history of the case put under permanent protection and training at an early age is very different from that of the cases which grow up at large in a modern urban or town community. Nearly all of the cases trained from childhood or youth may be taught habits of industry and comparatively good behavior, and at from 25 to 30 years of age a large proportion of them "settle down" to a condition of inhibition of the anti-social traits, and indeed to a condition of ostentatious pride in the virtues which they unwillingly practice.

Constant occupation at congenial work, with strict but kindly discipline, and with proper recreation, is the basis of the treatment required.

Butler of Indiana says:

"In the county and local jails we have frequent cause to note the relationship between feeble-mindedness and crime. Boys and young men mentally weak, are often found being held for trial or serving a jail sentence for rape, or attempted rape, incendiarism, or other crime.

"Many of the children whose cases are brought before the juvenile courts are mentally weak or come from homes where, because of the weak wills of the parents, they were not given proper training or direction.

"The last resort of the juvenile courts is the State Reform Schools. In these institutions are many children of this class of mental defectives.

"Mental defectives are frequently committed to the reformatories for adults. From studies made at the New York State Reformatory it is stated that this class constitutes about one-fifth of the population of that institution. A far larger proportion is reported as being incapable of controlling their powers or co-ordinating their faculties, and are termed 'control defectives.' The superintendent of the schools at the Indiana Reformatory states that about 21 per cent of those received are mentally defective on admission.

"In the State prisons also are to be found those who are feeble-minded. Some of these were nuisances in their respective communities; some were sent here because there appeared to be no other place to send them, others for the commission of offences for which they were not really responsible.

"In both reformatories and prisons these defectives are the most troublesome class of prisoners. Irrational, irritable, their weak minds led by their impulses, they interfere with discipline and their management requires the highest skill. Their presence at times leads to disturbances and sometimes to serious, if not fatal, assaults upon officers and inmates."

The literature of criminology teems with references to the close analogy between the imbecile and the instinctive criminal. They have a common heredity, and criminal anthropology proves that the evidences of degeneration—anatomical, physiological and pyschical—are identical in the two groups.

Is there not more than a close resemblance between the *imbecile* and the *instinctive criminal?* Is not the typical instinctive criminal of Lombroso a typical adult imbecile of middle or high-grade, plus opportunity and experience in the community?

We have only begun to study the relationship between imbecility and crime. The criminal tendencies of the epileptic are fairly well-known. The insane criminal is being studied from

many points of view. There are many crimes committed by imbeciles for every one committed by an insane person. The average prison population includes more imbeciles than lunatics.

We shall eventually apply our knowledge of imbecility to the study and management of juvenile incorrigibles and adult criminals. The ultimate application of that knowledge will materially modify the action of the courts and the methods of treatment and management of prisoners.

Cases of imbecility with criminal propensities—"criminals who have committed no crime"—will be recognized at an early age before they have acquired facility in crime, and permanently taken out of the community, and given life-long care and supervision in special institutions, combining the educational and developmental methods of a school for the feeble-minded with the industry and security of a modern penal institution. Such provision would be only a rational extension of the principle of indeterminate sentence, and if safe-guarded by careful and repeated expert examination and observation could do no injustice and would greatly diminish crime in the immediate future. Adult criminal imbeciles, or instinctive criminals, would be committed to such an institution under the same conditions. Similar cases developing in institutions for ordinary imbeciles would be permanently transferred to the special institution.

TUBERCULOSIS IN HOSPITALS FOR THE INSANE.*

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The subject of this paper was suggested by the observation that the death rate from tuberculosis is much higher among women inmates of hospitals for the insane than for the men in the same institutions. This condition first observed with reference to New York State was found, upon inquiry, to prevail quite generally throughout the United States and Canada.

During the year 1906, according to the report of the State Department of Health, there were 140,343 deaths from all causes in the State of New York. Of this number 14,027 were caused by tuberculosis—10 per cent. During the same year the State Commission in Lunacy of that State reported 2071 deaths in the State Hospitals for the Insane, of which number no less than 345 or 16⅔ per cent were caused by tuberculosis.

The high mortality from this cause in hospitals for the insane has long been recognized and the opinion was once held that the insane have a peculiar susceptibility to the disease, but its frequency varies in different institutions and to some extent in the different wards of the same institution, and this fact is one which has helped to modify the formerly accepted belief referred to. Accurate estimates of the frequency of tuberculosis in large public institutions do not often find their way into print but a few may be cited. Dr. Frederick Mott investigated this question with reference to the London County Asylums and found 1.72 per cent of the patients affected. In the year 1904 Dr. Frederick Peterson estimated that there were 500 cases in the State Hospitals of New York, or 2 per cent. At the St. Lawrence State Hospital, in 1906, a careful physical examination was made of the 1732 patients then resident and it was found that there were

* Read at the sixty-fourth annual meeting of the American Medico-Psychological Association, Cincinnati, Ohio, May 12-15, 1908.

78 who presented more or less definite physical signs of this disease. This is about 4½ per cent. In this examination tuberculin was not employed. In 1905 Dr. Menzies, Superintendent of the Staffordshire County Asylum, England, examined 647 patients, the entire population of that institution, employing tuberculin where necessary, and found no less than 123 or 19 per cent who gave positive signs.

From inquiries made by the writer during the past month, it appears that there are now in the 15 State hospitals in the State of New York, including two for insane criminals, 868 cases of tuberculosis. It is not practical to compare different institutions in that State for the reason that several maintain tuberculosis pavilions to which other hospitals transfer patients for treatment. The average frequency of the disease in the State hospitals in that State is 3 per cent or 30 per thousand of the population, which is probably a fairly accurate statement, obtained as it was, directly from each Superintendent, and should be regarded as representing as nearly as possible the prevalence of the disease in a population of about 28,000 insane persons, but it is conceded to be only approximate because of (as will be discussed later) the difficulty in recognizing the disease in the insane in its early stages.

Dr. William A. White gives in his annual report some interesting figures showing the frequency with which tuberculosis is encountered at autopsy. These figures are of particular value as representing the prevalence of this disease in a large, well-managed public institution, drawing its inmates from all classes of society and from a wide range of territory. His observations cover a period of 21 years and show that during that period autopsies were performed in about 60 per cent of the deaths. In 2102 autopsies the disease was encountered in active form 432 times, or more than 20 per cent, and latent lesions were observed in a still larger number.

There are two equally important sources from which hospitals recruit their tuberculosis: First—the cases which are admitted; which may or may not be recognized at the time, and second—those which develop in the institution. It is not possible to state positively which is the larger class, they probably differ in different institutions. Several of my correspondents referred to the large

number of patients afflicted with this disease which were annually admitted. At the St. Lawrence State Hospital during the last fiscal year, 38 patients were transferred to the tuberculosis pavilion. Of this number 15 were diagnosed on admission and 23 had been resident in the hospital for a length of time, as follows:

Less than six months	3
More than six months and less than a year	4
One to two years	1
Between two and five years	3
Over five years	12
	23

A certain number who developed the disease after a period of residence doubtless may have had it on admission. This seems probable where the disease became manifest during the first six months or year of the patient's residence, particularly if during that time his physical condition has remained below par, but where it only appears after a year or more of fair physical health the hospital may reasonably be charged with aiding and abetting the disease if not with originating it.

It is impossible in the great majority of insane patients to diagnose tuberculosis in its incipient stage by physical signs. The nice co-operation on the part of the patient to elicit the crepitant rale can rarely be obtained and one may be pardoned for failure to discover even fairly marked lesions in many patients. It is only when coarse physical signs, as consolidation, bronchial breathing, cough and expectoration occur that one can be sure of locating the lesion which may have been suspected.

So important is it to recognize the presence of this disease in newly admitted patients to safeguard the interest of the patient and the health of the household that, in the opinion of the writer, tuberculin should be unhesitatingly employed in all cases where the disease cannot be definitely excluded by physical signs. We have used at Ogdensburg during the last winter the ophthalmo-tuberculin of Calmette but do not regard it is infallible. With us it has failed to indicate known lesions, and cases are multiplying in literature in which its testimony is misleading. This test, as well as the cutaneous tuberculin reaction, will probably be found in the course of time to be only of value in furnishing presump-

tive evidence of the presence of tuberculosis which may be either active or latent and should be considered in connection with other symptoms and signs which are of known value. In any cases which seem to require it the writer would rely upon the constitutional reaction from an injection of Koch's old tuberculin, employing it as has recently been recommended by Dr. E. L. Trudeau.

Of those cases which appear to originate in the institution it is the experience of the writer that the majority of them develop on the wards occupied by the most demented and inactive patients, and there are other wards in which a case of tuberculosis has seldom or never occurred. There are two detached cottages at Ogdensburg known as the Garden Cottage and Farm Cottage, each accommodating about 70 able-bodied men who are employed in work on the grounds, in which, so far as I can ascertain, no case of tuberculosis has originated in the past 15 years, while certain other wards, among the so-called disturbed and untidy wards, have yielded one or more cases almost every year. The patients of this class because of their mental condition cannot be employed off the wards and for that reason lead a comparatively inactive and an indoor life. These too are the wards in large public institutions which tend to become over-crowded, even when the overcrowding in the hospital as a whole is not great. The fact that the ward is crowded, renders rather urgent the necessity of keeping people in their places. The requirements of good order as understood by the nurses and attendants is to have each patient seated quietly in his place, and to discourage all motor activity. The ventilation in the best of crowded wards is rarely good and when patients spend weeks, and months and even sometimes years in a ward of this character and at night retire in dormitories that are equally crowded, it is not surprising that a number of them finally succumb to tuberculosis. The mere fact of patients being crowded together appears to predispose them to this disease, even where the ventilation is regarded as good and the housekeeping above criticism. Dr. Menzies in a report already quoted, when speaking of his experience with tuberculosis and dysentery says: "Although it is difficult to say how over-crowding can cause disease, provided cleanliness and thorough ventilation are properly

attended to, still the fact remains that dysentery, erysipelas and tuberculosis always increase in over-crowded asylums, and one is driven to the conclusion that infection occurs more easily because patients are actually placed closer together and not because the over-crowding produces less efficient attention to the ventilation and cleanliness of the wards and patients." Those patients who can be employed and who, therefore, are off the ward a portion or the greater part of each day, unless crowded in sewing rooms and shops, are usually in a healthier condition and freer from tuberculosis than those remaining on the wards. As most institutions for the insane have farms or large gardens where patients may be employed, it is comparatively easy to find suitable employment out of doors for men, and difficult to provide work for women except housework and indoor occupations as sewing, rug making, chair caning, and other more or less sedentary tasks. Let us see how the prevalence of tuberculosis differs in the two sexes, bearing in mind this well recognized difference in the employment and modes of life of our hospital inmates. In the period 1888 to 1906, according to the report of the New York State Commission in Lunacy, there were 28,106 deaths from all causes in the New York State Hospitals for the Insane. Of these 15,242 were men and 12,864 were women. Among the men 1463 died from tuberculosis, 9.5 per cent, while among the women there were 2596 deaths from tuberculosis, which is 20.1 per cent more than twice the death rate among the men from this cause. The death rate among the men in State hospitals is slightly less than that of the State at large, among the women it is more than twice as high as that of the State at large, and what is more significant, more than twice that of the men in the same institutions. Inquiries made in other States show that the conditions are virtually the same throughout the United States. In almost every State in the Union the number of cases of this disease among the women greatly exceeds those among men.

The institutions of the South have a great problem before them in their efforts to control tuberculosis among insane negroes, a race among which this disease is much more common than among the whites. To what extent this is due to poverty and irregular modes of living and what to peculiarities of the race I

shall not undertake to discuss, but the fact remains that the death rate among negroes, both in and out of institutions, is high and is on the increase. In certain sections of the South very many of the insane are afflicted with it when admitted to the hospitals. Dr. F. J. Mitchell, Superintendent of the Mississippi Insane Hospital, says: "During the past biennial period our death rate has been unusually large, due we think to the fact that tuberculosis in its varied forms has with us been almost an epidemic, especially among the colored population, which, as a race, is quite susceptible to its influence, but in this institution the disease is almost restricted to the acute form and there are but few in which the duration exceeds four or five months before there is a fatal termination; besides, with the colored we find a much more hemorrhagic type. While it is true that the colored wards are much more crowded than the white, this alone, in my judgment, is by no means the only factor, but there must be a great disparity in the point of susceptibility, and this is greatly to the prejudice of the latter race. For the past ten years we have had infirmaries dedicated to tubercular cases, and with a close observance of the laws of hygiene the results have not been in accordance with our expectations." This opinion is sustained by the voluntary statements of several southern superintendents. Dr. W. F. Drewry, of Petersburg, Va., says: "For the last quarter of a century the prevalence of tuberculosis among the negroes has been on the increase and they seem to succumb more readily than the whites. In fact, in many cases the fatal results come within a few months." "This may be due, to some extent, to the deterioration in their physical condition, to the lack of proper nourishment, to their modern modes of living, etc." Dr. W. W. Faison, of Goldsboro, North Carolina, says: "Tuberculosis among the negro race is frightfully on the increase out of as well as in the hospitals. Many of our patients have it on admission."

In this connection the State of Alabama has given us an object lesson which is as instructive as it is gratifying. Until six years ago the whites and negroes were cared for in the one hospital at Tuscaloosa, which had become badly over-crowded. The death rate from tuberculosis had been uniformly high in both races, notwithstanding that efforts intelligently directed had been made to

limit it. In the biennial report of the Bryce Insane Hospital at Tuscaloosa for the years 1895-96, Dr. Searcy remarks: "Tuberculosis has been one of the most fatal diseases in the hospitals for the insane, as well as among the general population, and we have not been exempt from our share. Since the opening of the hospital about 20 per cent of all deaths occuring have been due to this disease. . . . The disease is more common among women than among men, and more common among the colored than among the white patients. During the past two years especial efforts have been made toward eradicating or diminishing the amount of tubercular diseases in our wards by scrupulous cleanliness of patient, clothing room, etc., and great care in disinfecting and disposing of the sputum and other discharges. The cases have also been, as far as possible, separated from the other patients, occupying rooms with hard finished walls, and prepared floors especially designed for tubercular cases. . . . We are much handicapped in a crusade against tuberculosis by the fact that patients in all stages of the disease are continually being sent to us as insane. Nevertheless the disease, particularly among the negroes, steadily increased in this hospital for several years."

During the two years referred to in this quotation, 1894 and 1895, the death rate from tuberculosis compared with the total deaths was 27 and 22, respectively, for the whites, and 51 and 39, respectively, for the negroes. Though the vigorous measures undertaken for stamping out the disease gave good results in steadily diminishing the death rate from this cause, still in the year 1902 the deaths were 20 per cent and 24 per cent, respectively, for whites and negroes. In that year a new institution was opened in Mt. Vernon for the reason that "The over-crowded condition of the hospital at Tuscaloosa had made it imperative that additional accomodations should at once be provided for the insane." That year provision was made for the insane negroes at the military reservation at Mt. Vernon, and in May they were removed, which gave much more satisfactory accomodation for both races. The result was reflected in the rapidly diminishing death rate from tuberculosis. Within four years the death rate had fallen to 9 per cent for whites and 22 per cent for colored, and according to a report received from Dr. Searcy there are at

present 13 cases per thousand among the whites at Tuscaloosa and 10 cases per thousand among the colored at Mt. Vernon, while of the death rate last year 14 per cent among the whites was caused by tuberculosis and only 9 per cent among the colored, which places the death rate from tuberculosis of the Mt. Vernon Hospital, an institution for the colored insane, one of the lowest in the United States.

There are a few large public hospitals for the insane in which the disease is almost, if not wholly unknown. I may refer to the State Hospital at Provo City, Utah, the Superintendent of which, Dr. Calder, informs me that there is not now nor has there been for the past five years a single case of tuberculosis among the 353 inmates. Practically the same may be said of the Territorial Asylum at Reno, Nevada, where the disease is unknown except for an occasional patient admitted with it, and there have been no deaths from it for several years past. It is interesting in this connection to notice that the altitude of these institutions is 4560, and 4500 feet, respectively, above the sea level, but Dr. Calder adds another significant remark when he says: "In this latitude we are able to have all of our patients, except now and then a bad patient, out of doors a part of each day, almost all of the year. During the spring, summer and fall they spend on an average five hours each day in the open air."

Prevention of Tuberculosis.

It is now generally recognized that among the insane as elsewhere tuberculosis patients should be removed from contact with the healthy and afforded the treatment which is now recognized to be the most appropriate and which can only be given in special structures of one sort or another as pavilions, tents and sheltered porches. To this end no patient should be admitted to the general wards of an institution until the presence of the disease has been excluded. Over-crowding in wards and dormitories should be avoided, and particularly those departments occupied by the demented and inactive classes. The writer realizes fully the difficulty in accomplishing this very evident precaution, but believes that when we can go to the legislature with stronger objections to overcrowding than mere difficulties of administration we will be more

likely to obtain the relief which we seek. All patients physically able should be exercised and when possible employed in the open air daily. When patients are in the wards they should be warmly dressed and fresh air should be admitted through open windows in such quantities as to effectually do away with any suggestion of foul air in the rooms. The clothing worn by one patient should not be used by another until it has been sterilized. The danger here is particularly in the use of shawls, hoods and wraps for the neck. The same rule should apply to the use of blankets and bed linen. Care should be exercised that infection is not conveyed through cups for drinking water. The wards for women, as well as for men, should be supplied with cuspidors of appropriate type and the patients taught to use them.

In the majority of hospitals for the insane of this country some provision is made for the segregation of tuberculous patients during the whole or a greater part of the year. A good number have separate pavilions for the treatment of this class, either in actual use or in the process of construction. Many others employ for this purpose protected porches or tents where the patients sleep eight or nine months of the year. The availability of tents for this purpose for the insane was first demonstrated at the Manhattan State Hospital by the late Dr. A. E. Macdonald and is fully described in the ninth annual report of that institution.

It is worthy of remark that those institutions which have provided separate pavilions or have adopted the use of tents have almost uniformly reported a decrease in the prevalence of tuberculosis in the institutions. Some of my correspondents have characterized it as a remarkable decrease. I have no figures to present except the result of the work of the tuberculosis pavilion at Ogdensburg, which to us have been extremely gratifying. During the first year of its operation four of the patients were discharged from custody, apparently cured of tuberculosis, and three of those cured, recovered of insanity, and the fourth much improved. Fourteen others improved to such a degree that all active symptoms departed and physical examination was either negative or showed only diminished resonance over the affected area. During the second year nine of the patients were discharged from the pavilion to other wards of the hospital as not requiring further

treatment, and five others were returned to their homes in a condition to resume their occupations. During the second year the number of deaths declined from 34 to 19, the lowest in seven years, and tuberculosis which has heretofore occupied first place in the causes of mortality had been reduced to fourth, although during that year several cases of the disease were transferred from other hospitals. During the present fiscal year the death rate promises to be even lower.

Notes and Comment.

ANNUAL MEETING OF THE AMERICAN MEDICO-PSYCHOLOGICAL ASSOCIATION.—The sixty-fifth annual meeting of the Association will be held at the Marlborough-Blenheim, Atlantic City, Tuesday, Wednesday, Thursday and Friday, June 1, 2, 3 and 4. Hotel rates at the Marlborough-Blenheim, and at other hotels in Atlantic City have been announced in a circular sent to members of the Association, and Dr. B. D. Evans, Chairman of the Committee of Arrangements, is endeavoring to provide for special railroad rates.

The following papers have been promised for the meeting:

Insanity Defense for Crime. By JOHN B. CHAPIN, M. D., Philadelphia, Pa.

Impressions of Some Asylums in Scotland. By CHARLES A. DREW, M. D., State Farm, Mass.

A Note on the Fresh Air Treatment of Insanity. By SANGER BROWN, M. D., Chicago, Ill.

Nursing of Male Patients in Hospitals for the Insane by Female Nurses. By THOMAS J. MOHER, M. D., Brockville, Ontario.

The Value of Staff Conferences in State Hospitals. By E. M. SOMERS, M. D., Ogdensburg, N. Y.

The Possibilities of Muscular Re-Education, following Cerebral Thrombosis. By C. B. BURR, M. D., Flint, Mich.

Aphasia. By BRITTON D. EVANS, M. D., Greystone Park, N. J.

The Acute Alcoholic Hallucinosis. By WILLIAM C. GARVIN, M. D., New York, N. Y.

A Report of Three Cases of Korsakoff's Disease. By CHARLES E. STANLEY, M. D., Middletown, Conn.

Peculiar Nuclear Changes in Ganglion Cells in a Case of Chronic Alcoholism. By FREDERICK S. HAMMOND, M. D., Trenton, N. J.

The Economics of Inebriety. By IRWIN H. NEFF, M. D., Foxboro, Mass.

Rest in the Treatment of Mental Diseases. By FRANK P. NORBURY, M. D., Jacksonville, Ill.

The Present Status of Women Physicians in Hospitals for the Insane. By MARY M. WOLFE, M. D., Norristown, Pa.

Sudden, Complete and Permanent Renunciation of Grandiose Delusions under Suggestion in a Case of Paresis. By RICHARD DEWEY, M. D., Wauwatosa, Wis.

A Study of Bodily Temperature in Paralytic Dementia. By ARTHUR B. COLEBURN, M. D., Middletown, Conn.

Note on the Form of Insanity in Four Years' Admissions to and Discharges from the Hospitals for the Insane in Massachusetts. By E. STANLEY ABBOTT, M. D., Waverley, Mass.

The Pathological Significance of Mental Symptoms—Wernicke's Classification of Symptoms. By AARON J. ROSANOFF, M. D., Kings Park, N. Y.

Comparative Psychological Study of the Mental Capacity in Cases of Dementia Præcox and Alcoholic Insanity. By HENRY A. COTTON, M. D., Trenton, N. J.

A Few Reasons for Failure in the Treatment of Epilepsy. By WILLIAM P. SPRATLING, M. D., Baltimore, Md.

Conscious Epilepsy. By L. PIERCE CLARK, M. D., New York, N. Y.

Epilepsy—Cause and Prevention. By J. J. WILLIAMS, M. D., Oxford, Ontario.

Hysteria—What It is and What It is Not. By CHARLES K. MILLS, M. D., Philadelphia, Pa.

Hysterical Insanity with Report of Cases. By WALTER A. TAYLOR, M. D., Trenton, N. J.

An Analysis of Psychoses Associated with Graves' Diseases. By F. H. PACKARD, M. D., Waverley, Mass.

The Infective-Exhaustive Psychoses with Special Reference to Prognosis. By SAMUEL W. HAMILTON, M. D., Utica, N. Y.

The Mixed Forms of Manic-Depressive Insanity. By GEORGE H. KIRBY, M. D., New York, N. Y.

The Ganser Symptom and Symptom Complex. By THEODORE I. TOWNSEND, M. D., Dannemora, N. Y.

Circulatory and Renal Defects in the Insane. By M. NELSON VOLDENG, M. D., Cherokee, Iowa.

The Application of Immunity Reactions to the Cerebro-Spinal Fluid. By J. W. MOORE, M. D., Central Islip, N. Y.

Some Cases of Dementia Præcox. By C. MACFIE CAMPBELL, M. B., New York, N. Y.

A Study of the Auto- and Somato-Psychic Reaction in Dementia Præcox. By WM. BURGESS CORNELL, M. D., Baltimore, Md.

The Cyclic Forms of Dementia Præcox. By WM. RUSH DUNTON, M. D., Towson, Md.

The Relation of Scarlet Fever to Subsequent Psychoses. By EDWARD B. FUNKHAUSER, M. D., Trenton, N. J.

Studies in Heredity, with Examples. By WILLIAM C. SANDY, M. D., Trenton, N. J.

The Psychoneuroses in Asylum Practice. By HENRY P. FROST, M. D., Buffalo, N. Y.

Papers, the titles of which are not yet announced are promised by BYRON M. CAPLES, M. D., Waukesha, Wis.; CHARLES K. CLARKE, M. D. (or DR. JONES), Toronto, Ont.; GLANVILLE Y. RUSK, M. D., New York, N. Y.; ALBERT WARREN FERRIS, M. D., New York, N. Y.; W. H. HATTIE, M. D., Halifax, Nova Scotia.

Those who propose to present papers should bear in mind the rule adopted last year, which requires that an abstract of the paper shall be in the hands of the Secretary in time to print and distribute to the members one month before the meeting. Authors of papers, who do not conform to this regulation will not, we are informed, be able to obtain a place on the programme.

We have long thought that the methods of procedure at the annual meetings of our Association might be changed with profit to its members, and to the increased dignity of the Association. Why the perfunctory addresses of welcome from governors of states, mayors of cities, chairmen of local committees of commercial exploitation and presidents of local medical or scientific organizations? Let us take it for granted that these gentlemen, that indeed the whole community and all its component societies and organizations wish to bid us welcome, and that they have a high appreciation of the vital importance of the matters we meet to discuss, and our eminent fitness and capacity to deal with them; but let us at the same time ask that we be permitted to take all this for granted.

Other medical and scientific associations are holding successful meetings without such welcoming speeches, without being told of the beauty of the city, and the surrounding country, the fertility of the soil or the commercial importance of the locality; why should the American Medico-Psychological Association feel that such preliminary oratorical display is necessary or edifying? And then why the necessity at the close of each annual session of appointing a committee to thank, in a set of resolutions, every person and organization that has been kind to us? Let this be done by individual members as their appreciation of the courtesies extended, and their sense of the fitness of things impel them. Why for example, should we extend the thanks of the Association to the newspapers for devoting the same space to our meetings, possibly less, because our papers and discussions are less easily understood, as would be given to those, let us say of an association of live stock breeders? Do not the editors of these papers always welcome anything which will supply the printers persistent demand for copy?

We do not for a moment wish to give the impression that the

meetings of the Association are not proper occasions for coming in contact with public officials and public organizations whose interest in our work may be properly and profitably enlisted, but let this interest be secured by means of lectures and papers and discussions to which the public may be invited. Let those whose political, commercial or social position is such that their influence or control may be made to influence public opinion upon questions in which we are interested be invited to these meetings and instructed in the best methods of conducting public institutions for the insane—or in the great importance of inaugurating a campaign in the cause of the prevention of insanity. Let the press, and through the press, the people, know of our Association, its aims and the work of its members, and the grave importance to the whole community of the subjects we meet to discuss. Let some official or committee be charged with the duty of aiding the representatives of the press in giving an intelligent abstract of such part of our proceedings as may be of interest or value to the public—and welcoming addresses and resolutions of thanks may be well omitted, and at the same time, more real good be accomplished.

THE HENRY PHIPPS PSYCHIATRIC CLINIC.—The Phipps Psychiatric Clinic owes it foundation and endowment to the conviction on the part of Mr. Henry Phipps that the time had come when mental diseases should be studied and treated as promptly and efficiently as other diseases in general hospitals. In America, as has been clearly pointed out by Adolf Meyer, the period during which special treatment had been sought in the majority of cases is a comparatively late stage of the disorder when the patient has become a source of danger to his friends and the community or to himself. The result of this has been an undue emphasis in the public mind upon the custodial aspect of the treatment which was then demanded for the safety of all parties and the confusion of his legal rights as a citizen with his natural right to prompt treatment as a sick man suffering from disease. The present theory provides for early treatment before the question of depriving the patient of his legal right to liberty, needs to be considered and places him upon the same footing as other sick persons in a hos-

pital. If mental disorders are to be successfully treated, it is obvious that relief should be sought before excitement, loss of self-control, morbid introspection, melancholic depression, fixed ideas of apprehension, wrong subjective impressions or morbid impulses have become fully established as a habit of the mind. Physicians do not wait for typhoid perforation before assuming the care of typhoid fever, nor for the development of pneumonia before treating a severe bronchitis, nor for broken compensation before ministering to a diseased heart, but patients, friends and physicians all unite in recognizing the need of skilled, prompt and efficient treatment in the incipiency of every disease. The treatment of mental disorders should be no less prompt in order that the period of subsequent complications or disasters may be avoided, abbreviated or arrested. With the leading thought that mental disease is to be treated at the earliest possible moment after the necessity of treatment is evident the founder of the Clinic wisely decided to establish it. His benefaction to the Johns Hopkins Hospital is the first attempt on a large scale in the United States to embody this conception in a practical form.

The building to be erected will accommodate not far from one hundred patients upon different floors of an ample five-story structure. In the basement will be an out-patient department with examining rooms and a large class-room for demonstrations to students and physicians—also rooms for hydro-therapy and mechano-therapy.

Upon the first floor are two observation wards with accommodations for fourteen patients of each sex—also general business offices, a large clinical and chemical laboratory and examining and reception rooms. Upon the second floor are the offices of the director of the Clinic, a library and seminary room, a large lecture hall, accommodating one hundred students, equipped with a projection apparatus and a chart room and two intermediate wards for fifteen patients of each sex with rooms for seclusion and permanent baths for the care of excited patients.

Upon the third floor there are large psychological and histological laboratories and research rooms with occupation and employment rooms and two convalescent wards for thirteen patients of each sex.

Upon the fourth floor are found single rooms and suites of rooms for private patients furnishing accommodation for eight patients of each sex with porches and open-air rooms—also rooms for the assistant medical director and the assistant medical officers.

Upon the fifth floor are roof gardens, exercise spaces, a gymnasium and assembly room, and rooms for photography and animal experimentation. Upon each story are balconies, porches and every convenience for open-air treatment. These plans have been perfected by Prof. Meyer and the architect, after a careful examination of all the best psychiatric clinics in England and upon the continent. The buildings will be plain externally and will conform to the general architectural plan of the Johns Hopkins Hospital in material and general arrangement. It will occupy the south side of the capacious lawn attached to the Johns Hopkins Hospital and all apartments for the care of patients will have a southern exposure while the portions of the building designed for study and research will have the advantage of a north light. The erection of the building will be undertaken as soon as the weather in the spring will permit. Every floor will be rendered easy of access by an elevator. The whole establishment will be warmed by hot water and lighted by electricity. Its equipment for treatment and for research will be of the most approved type. As soon as the building is ready for patients Prof. Adolf Meyer is expected to remove his residence to Baltimore to undertake the work of organization and administration. It is anticipated that much of the instruction will be of a post-graduate character adapted to physicians and that many of them who have hospital appointments in view or who desire to fit themselves for higher usefulness in psychiatry, will here avail themselves of opportunities which have not hitherto been afforded upon such a liberal scale in America, for the study of mental diseases. The time seems ripe for the inauguration of advanced work in psychiatry and the character of the equipment which is projected and the reputation of Prof. Meyer for thorough and painstaking labor in every branch of the study and treatment of mental disorders give promise of a new era in practical psychiatry.

It is anticipated also that the experience derived from the very successful work in the same direction at the Sheppard & Enoch

Pratt Hospital will prove of great assistance in the development of the new clinic. From the opening of that institution, now more than seventeen years ago, the medical director has consistently carried out the policy which he early announced, of confining its work, as far as possible, to the care of recent cases and using the resources of the hospital to promote careful clinical investigation of insanity. The hospital also, has been one of the few in this country which has afforded an opportunity for post-graduate work in psychiatry. The announcement made in its last annual report that one-half of the admissions for the year (all certifiable cases), came to the hospital voluntarily, without certification, is a gratifying illustration of its success in attracting the cases which it seeks to reach.

May the Henry Phipps Psychiatric Clinic be equally and increasingly successful! H.

HEALING CULTS.—The fact that Dr. G. Alder Blumer is one of the Associate Editors of this Journal ought not to forbid his associates on the Editorial Board to republish with recommendation to read the refreshing remarks "On Healing Cults," which appear in the Sixty-fifth Annual Report to the Trustees of the Butler Hospital. Dr. Blumer says:

> It is no part of a superintendent's duty to discuss in detail and criticize new methods of healing that have gained a widespread vogue with the public during the past year. And yet a passing reference to the unwisdom of certain latter-day practices, largely without the pale of medicine, may be permitted in so far as the subject is one that affects the kind of patients with whom we are constantly dealing. If the poet said, "the proper study of mankind is man," it must be admitted that this marvelous organism of ours, and especially the human brain and nervous system, has this in common with the external world of nature, that it yields up the mysteries of its working only to the most patient and unremitting toil, if, indeed, in some departments, it yields them up at all. After all, the crucial questions of our specialty lie in that borderland as to which it was said years ago by Professor Tyndall, in his memorable Belfast address, "the passage from physics to the phenomena of consciousness is unthinkable." Such words if uttered to-day would fall in many quarters, one fears, on unaccepting ears, and if the distinguished physicist were to return to life and to sweep the horizon of later intellectual achievement, he might find it convenient to wear a green patch over the eye that should rest upon a neighboring city whence most healing cults emanate and find their most fruitful soil. Unhappily there are too many who find the passage in question not only

not "unthinkable," but who think about it pretty nearly all the time. The word "subconscious" is being worked overtime everywhere and is apparently a sweet morsel on the tongues of the people who think they know what it means. My only warrant for this animadversion is the harm which I believe is done, especially among women, by dabbling in matters which were better left alone, for, alas, those who affect such studies, if one may call them that, are too often people whose nervous mechanism is unequal to the strain involved. And here I would fain quote the Rev. Dr. Joseph H. Crooker,* who has lately written words of wisdom for *The Christian Register*, a Boston publication, as follows:

"The experience of the centuries in differentiating religion and medicine is the wisdom of God . . . . For the clergy to ignore the verdict of the ages and attempt to revive an outgrown function will be harmful to both public health and to the Christian church, as it would be for surgeons to substitute magic for anæsthetics, or for doctors to give physic when repentance of sin is needed . . . . To carry it [mental therapeutics] into the noisy market place, and exploit its merits with the waving of banners and the blare of trumpets, will cause more invalids to suffer fresh torments and create more new patients with serious disorders, than many a doctor can cure. To get up a spectacular procession, to flourish gorgeous standards, and to shout aloud to the crowd, 'Come all ye that are sick and be mentally healed'—to follow this course is to invite seven devils to enter and take possession where only one previously existed!"

The good old maxim, *Ne sutor ultra crepidam judicaret*, finds little favor nowadays when the newspapers and popular magazines give the public inside information about multiple personality and the like problems of abnormal psychology and pander to an unlawful and insatiate appetite for that which its stomach is too weak to digest and not strong enough to reject. Unheeded, too, is the wisdom of Jesus, the son of Sirach: "Seek not out the things that are too hard for thee, neither search the things that are above thy strength. Be not curious in unnecessary matters." Time was when it was considered an indelicacy for gentle people to know much about what, with comprehensive vagueness, was called "the insides." Now no department of human anatomy is regarded as esoteric and beyond general reach. It is all very well to enlighten the laity about the basal facts of medical science, especially in relation to the recognition and prevention of disease, but the time has surely come when one should warn the public against running after the false gods of pseudopsychology and mediæval mysticism. Minds must be taken everywhere as one finds them, but the alienist of New England sometimes longs for more of that commonplace type of individual who is content to do his work in the world with singleness of purpose and without conjuring up psychic problems the consideration of which leads nowhither and which are as often as not insoluble.

* Quoted by Clarence B. Farrar, Journal of Nervous and Mental Disease, January, 1909.

There is sound philosophy in a brief entry in a diary, written by an officer in Nelson's day.*

"John Roskruge, master. Dead. A very good man, one that was better acquainted with rope-yarns and bilge water than with Homer and Virgil. He said a man's ideas should go no further than the jib-boom end."

There stands revealed in pregnant biography a gallant and sturdy seaman who had a seaman's eye for the rocks of heresy in an uncharted sea of trouble. Would that the red blood of John Roskruge might mingle freely to-day with an etiolated variety that is the product of other times and thus help, by raising the pressure of sanity at the fountain head, to solve some of the problems of modern psychiatry, especially the prevention of nervous and mental diseases, which now grow apace in the rapid evolution of the complex from the simple in this latter-day life of man.

MARYLAND PSYCHIATRIC SOCIETY.—The second meeting of this society was held on Tuesday, January 19, 1909, at the Maryland Hospital for Insane, at Catonsville. The members were entertained at dinner by the superintendent, Dr. J. Percy Wade, after which the meeting was held in the auditorium. Dr. W. R. Dunton, Jr., read a paper on Statistics and Classification of the Insane, making a number of recommendations. A committee, consisting of Drs. W. P. Spratling, J. Clement Clark, and A. P. Herring, was appointed to consider these and report at the next meeting, which will be held at Maryland State Hospital, at Sykesville.

PHILADELPHIA PSYCHIATRIC SOCIETY.—A society with the above name was recently organized, and the following officers elected: President, Dr. Charles W. Burr; vice-presidents, Drs. A. R. Moulton and W. W. Richardson; secretary and treasurer, Dr. W. W. Hawke; councilors, Drs. W. H. Haucker, J. K. Mitchell, and F. X. Dercum.

DETROIT SOCIETY OF NEUROLOGY AND PSYCHIATRY.—This society was organized November 19, 1908, at a meeting held at the Detroit Club, thirty members being enrolled. The following officers were elected: President, Dr. C. B. Burr; vice-president, Dr. David Inglis; secretary-treasurer, Dr. C. W. Hitchcock; these with Drs. A. M. Barrett and E. A. Christian, forming the council. It is intended that quarterly meetings shall be held.

* Quoted in "Over Bemerton's" by E. V. Lucas.

DEATH OF DR. ARGYLL ROBERTSON.—Douglas Argyll Robertson died Sunday, January 2, 1909, at Gondal, India, where he was visiting. *The British Medical Journal* for January 16, 1909, contains an interesting note upon his life and a high appreciation of his character and work. That for which he is most celebrated is his work on the relation of the pupillary reaction to nervous diseases to which his name is so frequently applied. In 1869 and 1870, he first drew attention to this in papers published in the *Edinburgh Medical Journal*, under the title "On Eye Symptoms in Spinal Disease." He was born in 1837, and graduated with M. D. from St. Andrews, in 1857. His medical appointments were numerous. In 1904 he gave up practice and retired to the island of Jersey.

DEATH OF DR. BROWER.—It is with great regret that we record the death of Daniel Roberts Brower, which occurred Monday, March 1, 1909, one week after he had been stricken with left hemiplegia. He was born in Philadelphia in 1839, and received his degree of M. S. from the Philadelphia Polytechnic College in 1860, and that of M. D. from Georgetown University in 1864. After serving two years as volunteer assistant surgeon, he became superintendent of the Freedmen's Hospital, Richmond, and then of the Eastern State Hospital for the Insane, at Williamsburg, Va., resigning in 1875 to enter private practice in Chicago, Ill. He was a member of the American Medico-Psychological Association and other medical societies. He was the author in conjunction with Dr. Bannister, of a well known text book on insanity, and made many contributions to periodical literature. He was honored by the bestowal of the honorary degrees of A. M. and LL.D. by Wabash College, Georgetown University, Kenyon College, and St. Ignatius College.

Of a genial, kindly nature, Dr. Brower was a most popular member of the profession and occupied a prominent position in Chicago.

DEATH OF PROFESSOR JOFFROY.—France has recently lost one of her leading neurologists and psychiatrists in the death of Alix Joffroy, Clinical Professor of Mental Diseases of the Faculty of Medicine of Paris, which occurred November 24, 1908.

twenty-two days before the completion of his sixty-fourth year. He was active in organizing the *Société de Neurologie de Paris,* in 1899, and was its first president, and in June, 1908, presided at the first sitting of the *Société de Psychiatrie,* in the formation of which he had also been active. He was a diligent laboratory worker as well as clinician, and his studies on toxic conditions induced by the alcohols and their impurities, and by morphine are well known. He had also made special study of the relationship between mental degeneracy and paresis, and drew especial attention to the juvenile forms of paresis. In the discussion held several years ago before the *Sociétié de Neurologie* concerning the relationship between syphilis and paresis he spoke strongly against the view that paresis is invariably a syphilitic disease.

Personally he was very popular, and the tributes paid him by the French medical press indicate that he was held in warm affection.

Half-Yearly Summary.

CALIFORNIA.—*Agnews State Hospital, Agnew.*—The reconstruction of this hospital, which it will be remembered was destroyed in April, 1906, by earthquake, continues. Fourteen buildings of the group are under construction, ten of which are nearing completion. A new and complete power plant is under contract, as is also a reinforced conduit to lead from this power plant to all the buildings to carry all steam, water, and gas pipes, as well as all electric wires. An additional appropriation will be granted by the Legislature now in session to continue the reconstruction, and several other buildings will be begun in the near future. The buildings are of reinforced concrete, modern in design and construction. The hospital, when completed for one thousand patients, will cost about $1,500,000. In the meantime 750 patients are still being cared for in temporary buildings, hastily erected immediately after the destruction of the hospital in 1906, and they are enjoying a great measure of freedom, which will be continued in the new hospital.

—*Mendocino State Hospital, Talmage.*—There has been completed during the past year a convalescent cottage for female patients that will accommodate about 120. There is also under construction another cottage for male patients that will probably accommodate 60 to 65 convalescent patients. It is also the intention to erect another cottage for 60 acute cases.

—*Napa State Hospital, Napa.*—The Legislature now in session has appropriated the following amounts to be used at this institution for the purposes named in the bills:

$25,000 to complete the water system, namely, the laying of a pipe line from the recently completed reservoir, which has a capacity of 125,000,000 gallons, to the institution, a distance of three and a half miles.

$8000 for remodeling and refurnishing the general kitchen.

$12,000 for building two additional wings and furnishing the same in connection with a cottage, which has been recently constructed for housing male patients. These cottages, when completed, will accommodate 200 patients. The plan being for a large center building for dining room and general living purposes, with four wings, each wing housing fifty people.

$40,000 for building and furnishing a similar set of cottages for housing 200 female patients.

$45,000, of which $10,000 is for furnishing, and the balance for completing the receiving and treatment cottage now under construction. A portion

of this building, namely, the wing for female patients, and the center building, will be ready for occupancy about the first of June. This building is built along modern ideas and the center building contains a thoroughly equipped hydrotherapeutic department, as well as a large operating room for surgical work; and in the basement of the center building will be an up-to-date laboratory, fully equipped to carry on scientific work.

The State of California is to be congratulated on having as its chief executive, Governor Gillet, who is in sympathy with hospital work and who has recommended to the Legislature that it grant liberal allowances in the way of special appropriations for the housing and proper care of the inmates of the hospitals, as well as for support and salaries.

CONNECTICUT.—*Hospital for the Insane, Middletown.*—At this hospital there has recently been completed a new wharf on the Connecticut River and a siding on the Valley Division of the N. Y., N. H. & H. R. R., for the delivery of coal and various kinds of merchandise used at the hospital. In connection with these improvements there has been built, and is now in almost daily use, an industrial railway, operated by electricity, for the quick and convenient delivery on the hospital grounds of coal and all kinds of merchandise required at the institution.

The new fireproof assembly room, the auditorium of which has a seating capacity of thirteen hundred, has also been completed. The auditorium is fitted up with stage and scenery for concerts, stereopticon and dramatic exhibitions, to which is added appropriate fittings for religious services on Sunday. In the basement of the same building a commodious hall for dancing has been provided.

A new brick fireproof carpenter and paint shop has been built and protected by automatic sprinklers, as is the stage of the assembly room already mentioned.

Two water filters have been installed, one with a capacity of 100 gallons per minute, which takes care of all the water delivered to the middle and south hospitals, and the other of less capacity, which purifies the water supplied to the laundry.

The training school for nurses continues in successful operation. The graduating class numbered six, all of whom remained in the service of the hospital at the close of the fiscal year.

Application has been made to the present Legislature for appropriations for a pavilion for the care and treatment of acute cases, and also for a nurses' home, both of which are much needed.

DISTRICT OF COLUMBIA.—*Government Hospital for Insane, Washington.*—On April 15 last the following circular letter was sent to the various members of the medical staff:

"*To the Medical Staff:* The receipt of this letter will inaugurate a new system of staff meetings, which will be held daily, with the exception of Sunday, at 11 o'clock, a. m., the Sunday meetings being hereby discontinued.

The meetings will be presided over by the superintendent, or in his absence by the first assistant physician.

"It is believed to be for the best interests of the patients, for the greater protection of the public, for safe-guarding the interests of the hospital, and for the promotion of the scientific knowledge of insanity that the members of the staff meet at stated intervals for the purpose of holding consultations regarding the several patients under their care. These meetings are for the purpose of arriving at diagnoses where possible, of discussing the advisability of paroles and discharges, and in general dealing with all questions relative to the mental and physical condition of the patients and the best methods of their treatment. To these ends there will be prepared in the office a list of all patients as they are admitted, and so soon as their histories have been written they will be read at staff meeting, when the conclusions of the writer may be criticized and corrected. This will provide a ready means of checking up the histories, as it will be expected that the history will be presented in each case within a reasonable time after admission. In every instance where the question of recovery is involved, or parole or discharge from the hospital is under consideration, the case shall be reported in full at conference for the purpose of inviting the opinions of the several members of the staff. From time to time cases about which difficulties arise may be presented for the opinion of the several members of the staff, and autopsy reports and further histories will be in order, especially as justifying, or otherwise, clinical diagnoses.

"Each senior member of the staff will be called upon to express an opinion in every case presented, and a stenographer will be present at the meetings for the purpose of recording these opinions. These opinions will be briefed by the stenographer and presented to the first assistant physician for his O. K., after receiving which they will be filed with the records of the respective cases under the title of "Conference Report."

Since the date of the above letter staff meetings have been held regularly every morning, except Sunday, at 11 o'clock. It has been found by experience that all of the work outlined in the above letter can hardly be done at these meetings, the number of cases under consideration is so great. Preference, therefore, is given to the cases of patients who are recommended for discharge. No patient is now discharged from the hospital without having his case read in full at the staff meeting, and the patient himself being present, so that he may be questioned by the different members of the staff.

It is felt that the discharge of a patient from a hospital of this sort, often, at least, involves great responsibilities, and the experience thus far in the staff meetings is that these responsibilities are met in a much more satisfactory manner by the thorough discussion that the cases thus receive.

ILLINOIS.—*Illinois General Hospital for Insane, Peoria.*—The census on the morning of March 10, 1909, was: Men, 1044; women, 1076; total, 2120.

On January 1, 1909, two new hospitals were occupied by one hundred

and twenty-five men and women, respectively. The buildings are two stories, of fireproof construction, each having four wards and sufficient single rooms to provide privacy for recent commitments. They contain an operating room, complete hydrotherapeutic equipment, clinical and pathological laboratories, as well as a department of light. There are eight solaria of stained glass of ruby, amber, violet, and opal colors, wherein phototherapy, which has been extensively applied in this institution for the last five years, will be given its most extensive test. The solaria are at the end of each ward and resemble an ordinary parlor or sitting room and selected patients can be placed in the indicated atmosphere without the slightest inconvenience. Immediate and startling effects will not be expected. Many of the chronic cases, who for years have shown a decided melancholia, will be kept for a long time in the red environment in the hope of returning cheerfulness and animation, as has been noted in more than one instance since phototherapy was introduced here. More immediate results will be looked for in the violet parlors where, under the soothing influence of the blue light the more violent and disturbed cases quickly become quiet. An exhaustive report of the operation of colors, based upon the extensive trial it has had in this institution will soon be published.

Dr. Geo. A. Zeller, superintendent, returned March 1 from a two months' trip to Europe, during which the clinics at Munich and Berlin were visited and a careful study of the Finsen Institute at Copenhagen was made. The new Finsen-Reyn light, for the treatment of internal disease, will be installed here and a state-wide clinic instituted.

Two farms of one hundred and sixty and eighty acres, respectively, were recently acquired and detached colonies will be established on each.

The State Board of Charities has approved bills before the present Legislature that will give seven additional buildings, including two psychopathic hospitals and two acute reception cottages.

The new Psychopathic Institute, under Dr. H. Douglas Singer, was opened at Kankakee last fall and the superintendent and every member of the staff attended. The course was so arranged as to permit the attendance of all of the assistant physicians of Illinois in relays and marks a new era in the institutional administration of the State. Dr. Singer will spend a week in each institution as often as sufficient case histories have been written up.

The occupation of the two new hospitals involved the moving of more than five hundred patients as well as the reception of one hundred and fifty new patients. To accomplish all this in one day in mid-winter, without a mishap of any kind, was considered a very successful undertaking.

A third tent colony for consumptives was completed in the fall and one hundred and fifty patients are now receiving the open-air treatment. They spent the long and severe winter in the tents with little inconvenience. Each colony is provided with a diet kitchen, and in addition to the regular food the most approved diet for consumptives is provided. One physician is detailed for this work and his statistics will soon be available.

Mr. Emil Coteus, physical director, had classes in every cottage throughout the winter.

The industrial department was greatly advanced by securing Miss Bratten as teacher. Eleven looms are in operation and there are three industrial shops. The exhibit of the output of the asylum industries made at the meeting of the State Conference of Charities last fall was most creditable. A similar exhibit at the Women's Club in Peoria recently attracted extensive and favorable attention.

IOWA.—*Cherokee State Hospital, Cherokee.*—Work on the new building under construction was discontinued last fall with the advent of cold weather and will be resumed this spring as soon as the weather will permit. This building, when completed, will accommodate 125 men and 125 women, and is intended for recent, acute, and purely hospital cases. It will be thoroughly fireproof and provided with a well-equipped department for hydro- and electro-therapeutics.

Contemplated improvements during the summer include a concrete root or vegetable cellar, fire station, and paint shop.

—*Iowa Institution for Feeble Minded Children, Glenwood.*—The inmates of this institution now number 1174, which is a decided increase, and was made possible by the completion of the central part and east wing of the Boys' Custodial Building, permitting the admission of a number of boys who had been on the waiting list for some time. The addition of this building also permits the complete separation of the custodial boys and girls, who prior to its completion were quartered in one building. The old Custodial Building is now being used entirely for girls. It is expected that the present Legislature will appropriate a sufficient sum of money to build the west wing of the Boys' Custodial Building. Should the appropriation be made, work will commence early in the spring. The cost of the central part and one wing was approximately $100,000.

The new water system is now in operation and was installed at a cost of about $55,000. With its completion, one of the most needed improvements has been added to the institution.

KANSAS.—*Topeka State Hospital, Topeka.*—The important improvements at this hospital during the past year have been:

The installation of a complete new water system, the cost of which was $20,000.

The institution has been provided with an ice and refrigerating plant at an expense of $15,000.

The building and equipment of a pavilion for female tubercular patients has demonstrated the value of special treatment for the tubercular insane. The improvement in the symptoms of nearly all the cases under treatment in the pavilion has been most gratifying. Patients who were bedridden

are now able to take daily walks, their weight has increased, and physical signs improved.

Two cottages with congregate dining room and kitchen are nearing completion. The cottages have capacities of 60 patients each and will be occupied by female patients. The buildings will cost $70,000.

Enlargements of the building for chronic insane men, are also nearing completion. These additions have cost $50,000. When these enlargements are completed the hospital capacity will be increased to 1400.

An appropriation for a reception hospital for women has been enacted by the Legislature now in session. Also an appropriation of $16,000 for a tubercular pavilion for men.

—*State Hospital for Epileptics, Parsons.*—An administration building, with auditorium attached, has just been completed and will be occupied at once. The building, which is three stories in height, constructed of buff pressed brick, stands at the head of the avenue leading from the main entrance to the hospital grounds. The entire lower floor will be utilized for offices, the second and third floors being used as living apartments. The auditorium annex has a seating capacity of five hundred and will be used for chapel services and as a general amusement room. Adequate office space and a room for assembly purposes have been much needed for several years. The entire structure with equipment cost $70,000.

A contract has been let for an 80,000 gallon steel water tank and tower and a direct service line pump. This is the beginning of the installation of a complete water system that will be completed during the next few months. The hospital has heretofore depended upon a system of water supply in connection with the city water works. Both the supply and the pressure have been, at times, entirely inadequate and these deficiencies have been a source of serious inconvenience.

The Legislature now in session has made an appropriation for an additional cottage for men. A cottage is contemplated for forty men of fairly good mental condition who are unwilling to stay in the institution, but whom it has been necessary to commit by the courts because of inability to care for themselves or the occasional display of violent or dangerous tendencies. This class is a growing one here and their management has been one of the most difficult problems.

A bill has also been introduced in the Legislature giving the hospital authorities more control over voluntary sane patients. The bill provides for the restraint of the liberty of such patients if, in the judgment of the superintendent, such a course is necessary for the welfare of the individual, and gives the management complete control over this class of patients until paroled or discharged. Sane epileptics received on voluntary commitment, acting for themselves if of legal age, or through their parents or guardian, if minors, may leave the institution, however, at any time by giving ten days notice of their desire to do so.

The number of patients in the hospital at present is 428.

MARYLAND.—*Springfield State Hospital, Sykesville.*—The new cottage, E, now nearing completion at the Women's Group, is similar to the others of the institution. It is a brick dormitory cottage, two stories high, extreme dimensions being 164 x 55, and will accommodate 75 patients. The first floor contains, besides the large day room (164 x 20) and single rooms, or alcoves, a large entrance hall, which by the main staircase, communicates with the basement and second story. Convenient to the day room is also placed lavatories, toilets, and clothes rooms. It also has three porches, one on the front, one on the rear, and one on one end; on the other end is a fireproof staircase, communicating with the exterior at the ground level.

On the second story, the entrance to the dormitory for the patients is through a large dressing room, containing a lavatory and alcoves. This dormitory consists of a room the same size as that of the day room on the first floor, as well as small single rooms. The cottage will be heated, lighted, furnished, and ready for occupancy by the first of May. The contract price of the building unequipped is $21,050.

The railroad from Sykesville to the Women's Group is about completed. The road will do much to lessen the operating expenses of the hospital, and many of the teams now used can be dispensed with. The road is about two miles long and has cost about $100,000.

MISSISSIPPI.—*East Mississippi Insane Hospital, Meridian.*—The new infirmary, for which an appropriation was made two years ago has been opened, and all the acute sick are cared for in this building. Large galleries have been added to each end of the main building, giving patients open-air sitting rooms.

NEBRASKA.—*Norfolk State Hospital, Norfolk.*—There will be two new buildings completed for use, one for men, of an approximate cost of $30,000, and one hospital building of an approximate cost of $70,000, the latter being one of the most modern hospital buildings in the United States. It is carefully planned for the special treatment of the acute insane. The work has been done well, and when completed it is safe to assume that there will be nothing better. The plans call for the installation of a hydrotherapeutic plant and the plumbing for this has been contracted for. The smaller building will be used for men who are trustworthy and can be of some use.

Plans have been made to improve the grounds by planting many kinds of shrubs and trees and macadamizing the roads, which, when completed, will make it one of the most beautiful places in the West.

NEW HAMPSHIRE.—*New Hampshire State Hospital, Concord.*—During the past two years new additions have been made to the buildings for disturbed patients of both sexes. These additions are of reinforced concrete construction inside the outside walls, which are of brick.

An addition to the laundry has been made and new hurricane dryers in an absolutely fireproof cabinet have been installed. The entire laundry work is done on one floor, the goods entering at one end and the finished product passing out at the other.

The farm house at Penacook Lake, which has hitherto been occupied only during the summer months, has been so far re-arranged as to accommodate patients throughout the entire year. A large wood lot has been purchased; a hennery has been built at this place and twelve patients have lived and worked at the farm, cutting wood and ice and attending to the care of the stock. It is proposed to acquire additional land in this neighborhood as rapidly as possible and eventually increase the size of the farm colony.

The trustees are asking the present Legislature for a new heating, light, and power plant. This will be made large enough to provide for future additional buildings.

The time for admitting to the State Hospital all the dependent insane of the State has been extended from January, 1909, to January, 1913. The present additions are only large enough to care for the natural increase in commitments. In order to accommodate all dependent insane of the State it will be necessary to erect one more large building, built on the dormitory and day-room plan for about 400 patients. With this addition the State Hospital will be enabled to care for all the insane of the State for some years to come.

The training school course has been extended from two to three years. The State Hospital has affiliated relations with two general hospitals and also with the District Nursing Association in the City of Concord. All nurses serve two months in district nursing work, thereby gaining a large experience in obstetrical work, and either three or six months in one of the two general hospitals, gaining an extended experience thereby in surgical nursing and children's diseases.

The hospital building, which was opened two years ago, has fully realized all that was anticipated. The entire building, both men's and women's departments, has been under the care of a head nurse and assistant women nurses. This arrangement on the men's side has proved eminently satisfactory. All new patients are admitted at this building and are transferred to other parts of the house as their mental condition requires.

New York.—It is reported that mental or psychiatric clinics have been opened in connection with the Vanderbilt Clinic and the Cornell University Medical School. It is expected that these will follow the usual plan and treat early cases of insanity or act in a consulting capacity.

—*Buffalo State Hospital, Buffalo.*—Additions to the acute hospital building have been commenced which will increase accommodations for acute cases on the reception wards by the addition of fourteen single rooms, and will not only increase hydrotherapeutic facilities, but will also give larger space for dining rooms, etc.

Two two-story verandas for the use of the infirm and less active patients in the men's wing of the main building have been begun. They are to be on the southerly side of four wards.

Bids were opened in February for the construction of a small pavilion for women patients suffering from tuberculosis. The pavilion is to be one-story and built somewhat in bungalow style, and will afford accommodations for about eighteen patients. It is to have ample veranda space, a large dormitory, a special diet kitchen, and a few isolation rooms. The lowest bid for this work is $6841.

—*Manhattan State Hospital, Ward's Island.*—Of many improvements started and completed during the past six months the following are the most important:

1371 new iron bedsteads, with woven wire springs, have been purchased to replace old strap iron beds.

The windows of the dining room in the annex building have been cut down, and an area-way has been made completely surrounding this building so that the light and ventilation of the dining room have been very much improved.

About $250 worth of shade trees were purchased last fall and set out.

A new engine has been installed in the laundry. This provides a second engine, so when one is out of repair the other can be used, and insures against such delays as occurred in the past when the laundry engine has broken down on several occasions.

Necessary plumbing has been installed in the building formerly occupied as carpenter and paint shop, now occupied as a mat and shoe shop.

The general health of the hospital during the past six months has been excellent. There have been no cases of contagious disease, except one of measles and one of chicken-pox in the women's division among the nurses. In the men's division there have been two cases of typhoid fever which have run the usual course. As a preventive measure the drinking water has been boiled and cooled, as mentioned in the last summary.

The work of the training school, under the supervision of Miss Alice R. Townsend, has continued with much satisfaction.

An addition to the south end of Camp Dent is to be made, essentially following the same plan in construction as in the case of the pavilion itself. This is to be done in the spring, and for this purpose the necessary cement supports for the timbers have been already placed. This will relieve the crowded condition of this pavilion very much.

The staff meetings have been held each week day in the two divisions of the hospital by Dr. George H. Kirby, the director of clinical psychiatry. The doctor gives his entire attention to this work and the meetings have continued to develop in interest. The history of each case is carefully and thoroughly investigated, both as to mental and physical condition, soon after admission, and a provisional diagnosis in each instance is made. After an interval of several weeks, or a few months, the case is reviewed, and the

diagnosis either confirmed or changed according to the ultimate findings in the case. Each case that progresses toward improvement and recovery is again presented for staff consultation before being discharged. It has been the custom to parole all cases when possible for a period of at least thirty days, and in many instances this has been extended, if it seemed desirable to continue the case under the observation of the officers of the hospital. During this parole period the patients are expected to report once a week in order to ascertain the progress of the case. It is now intended to parole the majority of the cases going out for a period of six months, although it is intended to officially discharge at any time during this period if the condition seems to be unusually favorable or if the patient is to leave the vicinity of the hospital district.

On each Thursday afternoon, between one and two o'clock, a meeting of the staff from both divisions of the hospital takes place in the hospital autopsy room of the morgue. Dr. Rusk, the hospital pathologist, conducts these meetings, and the autopsy results in cases of recent death are discussed in connection with the clinical findings of the case before death. These meetings are very instructive and of exceeding interest. During the fall the monthly staff meetings have been resumed. These are held during the evening in the staff-house parlor, and are usually attended by a number of physicians from the city. Original papers are read at these meetings and cases of special interest are presented, followed by the usual discussions.

For several months the State Hospital at Central Islip has received nearly all the cases committed from the Psychopathic Ward at Bellevue Hospital, but for the last two or three weeks this hospital has been receiving alternately with Central Islip. This arrangement gives considerable relief in a way, but the hospital is still very much overcrowded. On February 16 fifty men patients were transferred to the Hudson River State Hospital at Poughkeepsie, N. Y.

Dr. E. L'H. McGinnis, recently appointed on the consulting staff of the hospital, and who is known as a prominent specialist in the city, being connected with several important hospitals, is making arrangements to equip the treatment room with new and modern electrical appliances, thus bringing this department fully up to date for the purpose of improving our facilities for electrical therapy.

—*Rochester State Hospital, Rochester.*—The superintendent's residence has been completed. It is intended to build a mortuary, dispensary and laboratory, a new greenhouse, and a new barn at the Lake Farm, during the present year.

—*Gowanda State Homeopathic Hospital, Gowanda.*—The State Commission in Lunacy has let the contracts for a new cold storage for this institution, the appropriation being $25,000, and for a tuberculosis pavilion costing $12,000 to accommodate 50 women patients. Work will be commenced on these buildings as soon as the weather will permit.

—*St. Lawrence State Hospital, Ogdensburg.*—There has been established at the hospital a free dispensary, where poor and indigent persons suffering from incipient mental or nervous affections may consult with the physicians of the hospital and receive advice. The individual treatment of such persons will not be undertaken, but they will be referred back to their family physician, and a letter will be mailed to him summarizing the neurological and mental findings, and advising as to the management of the case, and the medical and hygenic treatment. No fee or gratuity of any kind will be received and no medicines will be dispensed or sold. Dispensary hours will be Saturdays only, from ten a. m. to three p. m.

It is earnestly hoped that the establishment of the dispensary will meet the approval of the medical profession and the public, and that the hospital authorities may have the co-operation of all intelligent people throughout this district, in their efforts to afford early oversight and treatment to all persons with any nervous disease or mental infirmity, which, if not rightly handled, might lead in time to insanity.

—*Hudson River State Hospital, Poughkeepsie.*—On October 1, 1907, the census of this hospital was 2385 and at the present time it is 2808. 350 patients have recently been received upon transfers from hospitals in the New York City district.

The reception of these patients was made possible by the opening of Inwood and of the Reception Hospital. Inwood accommodates 440 patients and the Reception Hospital 80.

An addition to the nurses' cottage has been made which accommodates fifty employees. There is under way the finishing of a portion of the third floor of Inwood for employees; about thirty will be accommodated in this building. The old amusement hall has been made into an infirmary with accommodations for about forty patients.

Sun rooms have been added to Wards 23 and 24, 26 and 27.

An operating pavilion in connection with the administration building is almost completed.

During the past year there has been a number of cases of diphtheria and two cases of small-pox. The cases were cared for in the isolation building and were successfully controlled by the use of vaccination and diphtheritic antitoxin.

In the laboratory the work showed an increase of about 30 per cent over last year.

The recovery rate for the year ending September 30, 1908, was about 30 per cent on the number discharged, exclusive of those transferred to other hospitals.

Several cases have taken advantage of the new law which permits of the voluntary admission of those who feel the need of treatment.

A merry-go-round was installed during the past summer and afforded much enjoyment to the patients.

—*Matteawan State Hospital, Fishkill-on-the-Hudson.*—On February 2, 1859, the State Asylum for Insane Convicts was opened at Auburn, N. Y. So far as can be learned, it was the first separate institution founded for the special work of caring for the insane of the criminal class.

On February 2, of this year, some thirty friends of the hospital, including many old staff men, gathered at the Matteawan Hospital for luncheon, and to talk over the earlier days spent in the service of the institution. By good fortune, Dr. Carlos F. MacDonald, who did so much to advance the standing of the asylum during its Auburn days, was able to be present, and to relate, in a delightfully instructive way, the early history of the institution.

For the first twenty years of its existence, its work was unknown outside of the State of New York. Politics entered very largely into its management, with frequent resultant changes to both medical staff and employees. A review of the work of the hospital shows that its real life did not begin until 1876, when Dr. MacDonald assumed direction. Since this time it has gained a world-wide reputation, its methods frequently being copied—not only at home, but in foreign countries. Through Dr. MacDonald's efforts, deplorable conditions present on his assuming charge were removed, order replaced chaos, a thorough discipline was instituted, and a fundamental basis for government established which was so sound and enduring that much of it is in vogue at the present day.

Noteworthy among the early accomplismments was the abolition of mechanical restriction and seclusion—probably the first instance in this or any other country where the most dangerous of all the insane were so broadly and liberally treated. In short, the criminal who became insane while under sentence, was given practically the same chance for recovery that his non-offending brother would receive in a civil institution. To bring cheer to the minds of the patients and to remove ideas of prison surroundings (for the Auburn Building adjoined the prison, even though the management was separate), entertainments were organized, healthful out-door exercise was required, and employment given whenever practicable.

Some fifteen years after its opening, laws were passed which enabled the courts to commit, in their discretion, such cases as were held on any process other than a civil one, and who were declared insane previous to conviction. The title of the institution was changed to the State Asylum for Insane Criminals. Then the growth of the asylum became very rapid, and in 1892 the old Auburn location was abandoned for the present Matteawan buildings—much more modern in construction and sanitation. At the same time, the title of the institution was again changed to Matteawan State Hospital, under which it is known at the present time. At the beginning, the population of the institution had been made up solely of insane convicts. After the unconvicted criminal insane were added to the population, even the new buildings at Matteawan became insufficient to accommodate the demands made upon them. In 1900 the male convict population was transferred to the new Dannemora Hospital, the uncon-

victed criminal class being retained at Matteawan. At the beginning, the Auburn Asylum served as an adjunct for the prisons. At present, Matteawan institution serves as an adjunct for the courts of the State.

It was noted on the occasion of this semi-centennial celebration, that two of the early members of the Auburn staff (Dr. Carlos F. MacDonald and Dr. Charles W. Pilgrim) had later become president of the State Commission in Lunacy, and that the records of other physicians who had gone out from the old Auburn institution, as well as those from Matteawan, were highly creditable, and that the hospital had done its full share in developing the care and treatment of the insane.

After luncheon an adjournment was made to the wards of the hospital, the afternoon being spent in visiting the various departments of the institution; this visit affording many of the assistant physicians, who had returned, an opportunity to chat pleasantly with patients whom they had formerly known, and possibly treated.

At the conclusion of the visit, the guests were given photographs showing the Matteawan institution as it appears at the present time, while in the corner was a small reproduction of the old institution at Auburn—the size of the two prints showing the relation between the population of the hospital at the present time and at the date of the transfer from Auburn.

The visitors were especially interested in the new Nurses' Home, which is the beginning of a new block to which all women patients will ultimately be transferred, from the main buildings. The construction of this building is of brick, steel, and concrete, and, so far as is known, is the first fireproof building for nurses built on State hospital grounds in the State of New York.

—*Utica State Hospital, Utica.*—The Acute Building, although not fully completed, has been occupied since January 9, and has helped to relieve the overcrowding of the institution.

On January 20 and 21, under the direction of Drs. Macfie Campbell and Dunlop, of the Psychiatric Institute, a clinical conference was held at this institution. Dr. North, superintendent of the Dannemora State Hospital, and assistant physicians from the Willard, Buffalo, Binghamton, St. Lawrence, Rochester, and Gowanda State hospitals, were present.

The first of March a clinic was held at the institution. It was attended by the members of the Utica Medical Library Association and other physicians.

—*Willard State Hospital, Willard.*—A pavilion for the care of tuberculous women was completed and occupied in November last. This building is situated on an eminence over a mile back from the shore of Lake Seneca, on the south side of the women's infirmary, and commands a magnificent view to the south and west, which takes in nearly the whole length of the lake as far as Watkins and the country to the west of the lake. The building accommodates thirty-six patients and is composed of a dormitory, three

single rooms, two lavatories, bath room, two clothes rooms, day room, dining room, and kitchen. The dormitory is in the center and is 84 feet long and 21 feet wide. On each side of the dormitory—north and south—is a veranda 122 feet long and 12 feet wide. The upper part of the sides of the dormitory, day room, dining room, and kitchen is inclosed in glass, which permits the free access of light and air.

An ice-making apparatus, with a capacity for making five tons per day, has recently been placed in the cold-storage building at a cost of $2000. This will be much needed during the coming year, as no natural ice has been stored, owing to the unusual weather conditions which have prevailed throughout the winter.

Two new engines and dynamos, with a capacity of 75 kw. each, have been installed at the electric light plant in place of old machines which had been in use for nearly twenty years, and it is expected that another machine will be installed within the next few months which will entirely replace the old equipment. A new 150 horsepower boiler has been set up at the Pines boiler-house, which is the heating center for the laundry, cold-storage building, and the four cottages and kitchen which comprise the group known as the Pines.

Fifty patients—twenty-five men and twenty-five women—were transferred from the Kings Park State Hospital March 10, which brought the census at Willard on that date up to 2355, the highest it has ever been in the history of the institution.

—*Craig Colony, Sonyea.*—Two small frame isolation cottages for contagious diseases—one for each sex—have been completed.

The two cottages for tubercular cases, to accommodate 40 patients in each, are to be erected during the coming summer. They are to be two-story structures with a southern exposure.

The enlarged bakeshop has been completed, and the new equipment is being installed. This consists of a three-barrel dough-mixer, a dough-divider, and a dough-molder—all driven by electric motors.

Owing to the mild winter the ice harvest was exceedingly poor. An effort is being made to secure an appropriation to install a refrigerating plant.

The Service Building, in the Women's Group, was completed and opened for use in February. This building has a large, well-lighted sewing room on the first floor, and on the second floor two large school rooms for girls.

Five cases of chicken-pox, two cases of diphtheria, and one of measles occurred during the past six months.

One female attendant died in February from typhoid fever, which disease was contracted outside the Colony. Several weeks previous to the onset she had cared for a sister ill with the disease, who lived 200 miles distant from the Colony.

The Board of Managers of the Colony, at their October meeting, changed the name of the Executive Building from Sonyea Hall to Spratling Hall, in honor of the departing superintendent.

The fire department has been reorganized and regular monthly drills are held. The equipment consists of the following pieces of hand apparatus: Hook and ladder truck, chemical engine, and six hose carts. A fire alarm system is to be installed during the coming summer.

A chair-caning and shoe-repairing department has been organized under the direction of a hired shoemaker.

Conferences of the medical staff are held twice each week to present newly-admitted patients and others showing conditions of interest.

A vertical filing system for keeping the medical records is being installed.

Two thousand dollars was expended recently in placing wire guards over radiators and steam pipes.

The present capacity of the Colony is 1270—census 1285. There are on file over 800 applications for admission.

NORTH DAKOTA.—*State Hospital for the Insane, Jamestown.*—The movement of population for the six months ending December 31, 1908, was as follows:

	Male.	Female.	Total
Number of patients in hospital June 30, 1908	350	188	538
Number of patients on parole	21	11	32
Number of patients admitted July 1-Dec. 31, 1908	78	39	117
Total cases treated	428	227	655
Number of patients discharged	40	25	65
Number of patients died	13	9	22
Number of patients remaining Dec. 31, 1908	382	195	577
Number of patients on parole Dec. 31, 1908	13	11	24
Average number of patients present during period	364.29	192.87	557.16

The Legislative Assembly has recently appropriated the following amounts for the improvements indicated:

Finishing fireproof ward building	$62,750
Hospital for tuberculosis and contagious diseases	25,000
Local telephone system	1,000
Extension to kitchen building	8,500
Extension to bakery	1,500
Ice house and fuel shed	2,000
Sewage disposal plant	5,000
Re-wiring for electric power current	1,500
Two new boilers	6,000
Sanitary repairs	1,500
Improvements to grounds	1,000
Additional land	4,800
To furnish and equip new ward building and hospital for tuberculosis and contagious diseases.	5,000
Bread-mixing machine and motor	500
Total	$126,050

For current and contingent expenses for the biennial period the resources will be upwards of $235,000, depending upon the average daily number of patients present during the period.

OHIO.—*Masillon State Hospital, Masillon.*—The prospective dairy farm, mentioned last year, is now quite well equipped and in full operation. It comprises 167 acres of farm land. On this is situated a cottage of nine rooms. This was completely remodeled for the housing and caring for of 25 patients, and is situated one and a half miles from the institution proper. A cow barn has been built along sanitary lines, and has a capacity of 117 cows. A 10-horsepower engine has been installed to steam-cook the food and make mash. The silos put up last year for ensilage corn have proved satisfactory.

There are about 250 maple trees on this farm. These, together with an equal number of trees on the institution grounds, have already yielded upwards of 100 gallons of maple syrup.

In addition to the four Green stokers under the 480-horsepower boilers, chain-grate type, there have been lately installed three Playford stokers, under the 350-horsepower boilers. These are also of the chain-grate type. Two 80-ton overhead coal storage bins were erected. One 10-ton Bartlett-Snow crusher, and two coal elevators, Bartlett-Snow type, for the purpose of filling overhead bins, were also installed. One 20-horsepower motor runs the elevator.

The intention is to reconstruct the water-heating system for domestic purposes, and install a new high pressure steam line, connecting boilers with engine room.

—*Columbus State Hospital, Columbus.*—A bequest of over $2000 has been utilized to build two new greenhouses separated by a propagating house, each being 190 feet long. The construction is chiefly iron and cement.

The Harris Cottage and Nurses' Home, of which mention has been previously made, have been occupied for several months.

An addition to the laundry which doubles its capacity has been completed, machinery costing about $2500 has been installed, also tanks to soften the water for laundry purposes.

Ice is now being made in the new cold-storage plant, which is just back of the kitchen, and connected with it by a covered passage which forms a platform on which supplies may be carried. The facilities for handling meat, milk, etc., are up-to-date in every particular.

Mr. Eugene McCampbell, who is connected with the bacteriological laboratory of the Ohio State University, has been engaged to work in the pathological laboratory this summer and it is hoped will develop interesting questions.

—*The Ohio Hospital for Epileptics, Gallipolis.*—At the earnest solicitation of the medical officers and the trustees of this hospital, the House of

Representatives of the Ohio Legislature included in the general appropriation bill for 1909 an allowance of $5000 to be used for the scientific study of the nature and causes of epilepsy. This sum was to be at the disposal of the superintendent of the hospital and used by him in payment for the services of a pathologist or other scientist and for other scientific purposes. Studies were to be prosecuted in the excellently equipped laboratory of the hospital. The Senate, however, so amended the bill as to leave out all provision for this work, and scientific work cannot, therefore, be taken up this year.

Many improvements, especially in mechanical equipment and the betterment of the buildings, have been made within the past year. A new electrical unit has been installed, the heating system has been overhauled, and extensive improvements to the boiler plant will be undertaken this year.

The buildings used by the hospital for all purposes, exclusive of barns and outhouses, now number forty-four. In the past four years the population has increased from about nine hundred to more than fourteen hundred patients.

OREGON.—*Oregon State Insane Asylum, Salem.*—At the recent session of the Legislature $300,000 was allowed for improvements for the Oregon State Insane Asylum at Salem, but a clerical error by the enrolling committee made the bill invalid. A special session has been called as a result, which meets on the 15th of this month; we presume the amount will be allowed beyond question; also, $490,000 was allowed for maintenance for the next two years. Dr. Harvey Clements has recently been added to the medical staff as pathologist, and he has installed a modern bacteriological and pathological department.

PENNSYLVANIA.—*Philadelphia Hospital for the Insane, Philadelphia.*—Five additional graduate female nurses have been placed on day and night duty in the two male infirmaries. In these wards there are about one hundred bed and convalescent patients, requiring active medical treatment.

—*State Hospital for the Insane, Norristown.—Department for Men.*—On February 11 the new building for the unclean and demented patients was opened. This building is designed to hold from 225 to 250 patients, but at present the first floor only has been occupied, with 110 patients. This building has been placed entirely in charge of female nurses and thus far this arrangement has been most successful. It was designed especially for this class of patients and is unusually well-planned as to ventilation and has a separate kitchen with special dietary for the patients occupying the building. It is found that a more economical dietary can be used advantageously with this demented class.

The convalescent building for men is nearly completed and will be occupied in the spring. It is intended to hold from 80 to 100 patients. The new assembly hall contains an auditorium for amusements and religious ser-

vices, located upon the second floor, while the first floor is devoted to a dancing hall. This building will be finished in the late spring. The Nurses' Home for male employees is well under headway and will be finished during the coming summer.

When all of these buildings are completed the overcrowding will be practically eliminated.

—*State Hospital for the Insane, Norristown.—Department for Women.*—The large building for feeble and untidy patients has been occupied a short time and will be a great benefit to the patients. The hospital has been very badly crowded for some years and there is now relief from the overcrowding. A short time ago the position of fifth assistant was created in both departments of this hospital, and a system of internes. Neither of these positions have been filled as yet in this department.

—*Pennsylvania Institutions for the Feeble-Minded.*—Pennsylvania has three institutions for the feeble-minded—located at Elwyn, Polk, and Spring City.

The aim of these institutions is to provide suitable training for all children who by reason of feeble-mindedness are unable to receive appropriate instruction in the common schools and to provide a home and suitable employment for the older feeble-minded who are, on account of their mental condition, unable to compete with normal men and women or to manage themselves or their affairs with ordinary prudence.

The first institution, or school, for the feeble-minded in Pennsylvania was established in Germantown in 1852. The first money for its support was raised by private subscription, the State contributing an equal sum. In 1855 this school was transferred to its present site at Elwyn. And there as the Pennsylvania Training School for Feeble-Minded Children it has attained a world-wide reputation, and from a small beginning has grown to its present state of perfection. In its growth it has played a most important part in the development of methods of care and training. Its present population is more than one thousand and it has a long waiting list. It is one of the semi-State institutions.

The State Institution for the Feeble-Minded of Western Pennsylvania, at Polk, was established by Act of Assembly in 1893. It is beautifully situated among the hills of Venango County, on a tract of thirteen hundred acres, is built on the cottage plan and is most admirably adapted in every way to give the best possible care, training, and treatment for those for whom it is intended. Its present population is thirteen hundred, which will be increased to fifteen hundred on the completion of buildings now in course of erection. It is a strictly State institution for Western Pennsylvania, receiving pupils from the following counties: Allegheny, Armstrong, Beaver, Butler, Bedford, Blair, Crawford, Clarion, Cambria, Clearfield, Cameron, Centre, Clinton, Erie, Elk, Fayette, Forest, Fulton, Greene, Huntingdon, Indiana, Jefferson, Juniata, Lawrence, Mercer, Mifflin, Mc-

Kean, Potter, Somerset, Venango, Westmoreland, Washington, and Warren.

The Eastern Pennsylvania Institution for the Feeble-Minded and Epileptic, at Spring City, was established by Act of Assembly in 1903. Only that portion of the institution for the care of boys has been completed. At present about three hundred boys are being cared for. This institution, on the completion of the cottages in course of erection and under contemplation, will provide care, training, and treatment for about one thousand. It is a strictly State institution for Eastern Pennsylvania, receiving pupils from the following counties: Adams, Bradford, Berks, Bucks, Carbon, Chester, Cumberland, Columbia, Delaware, Dauphin, Franklin, Lackawanna, Lancaster, Lehigh, Lebanon, Luzerne, Lycoming, Monroe, Montour, Northampton, Northumberland, Philadelphia, Perry, Pike, Sullivan, Susquehanna, Snyder, Schuylkill, Tioga, Union, Wayne, Wyoming, and York.

Although on the completion of the Spring City Institution Pennsylvania will have provision for about four thousand feeble-minded, its provision for this class of its population will still be inadequate.

The total number of the feeble-minded enumerated in Pennsylvania in the census of 1890 was 8753. No enumeration of the feeble-minded was made in the census of 1900. Whether the condition is or is not more prevalent than formerly, there is no reliable information on which to form an opinion. It is quite clear, however, that the condition is one deserving the gravest consideration.

Within recent years there has been a great increase in the number of the feeble-minded cared for by the State and a tremendous increase in the number of applications for admission to the institutions. This may be accounted for, in part, by a better appreciation of the advantages of special training and institution life for the feeble-minded, and in part by the more rigorous competition of modern life.

The proper care of the feeble-minded by the State within appropriate institutions is now recognized as not only charitable, but economical.

Within the institution the feeble-minded child receives as high degree of education as he is capable of acquiring. His senses are trained. He is taught to care for his body and dress, is given instruction in reading, writing, and arithmetic, and such physical and moral training as he can profitably acquire. Special attention is given to manual training, recognizing that his future usefulness depends more upon manual dexterity than upon mental attainments. Music adds to the enjoyments within his limited horizon.

A larger proportion of the feeble-minded, notwithstanding the most careful training and treatment, are never able to take an independent part in the community. At large they are as a ship without a rudder. For such the State provides a congenial home where, protected from evil influences and surrounded with simple pleasures, he may work and play, happy to the end, and depart without leaving a burden upon posterity. Every dollar now expended for his care saves hundreds in the years to come.

—*State Hospital for Criminal Insane, Fairview.*—Two buildings, each of two stories in height, are at present under construction.

SOUTH DAKOTA.—*Asylum for Insane Indians, Canton.*—The institution has been placed under the direction of a physician. Owing to the extreme prevalence of tuberculosis among the Indians, the matter of providing suitable buildings for them is at present under consideration, but as yet it has not been decided whether to treat them in tents, shacks, solariums, or to build a large hospital, with a solarium combined.

VIRGINIA.—The General Board of Hospital Directors has procured a farm, containing 1000 acres, near Lynchburg, upon which will be established a colony for epileptics. To begin with, only the insane epileptics now confined in the hospitals for the white insane will be provided for. It is generally believed that the Legislature next winter will enlarge the usefulness of this new institution by admitting both sane and insane epileptics. It is also the general impression that the colony will then be established as a separate and distinct institution, it having been temporarily established under the supervision of the Western State Hospital.

—*Central State Hospital, Petersburg.*—The annual report for the fiscal year ending October, 1908, shows a population for the year of 1611; remaining at the end of the year, 1285. Three hundred and ninety-five patients were admitted, a somewhat larger number than usual. Special attention is called to the inadvisability of caring for the criminal insane in the institution as at present constructed and organized. Separate provision for this class is urged, either at this hospital or elsewhere. Attention is called to the increasing number of patients having a suicidal tendency, this having been heretofore rather unusual with the colored insane.

There is in process of construction a pavilion or cottage for female tubercular cases, having a capacity for 50, located on an elevation several hundred yards from the main hospital group. The building is one-story high, and is constructed of hollow concrete blocks, has both single rooms and dormitories, separate examining room, kitchen, dining room, etc. There are ample porches, sun parlors, and sitting and lounging rooms. Since 1904 all the tubercular patients have been cared for in inexpensive wood pavilions and tents, none having been housed with other patients. A considerable part of the material for construction of the new cottage is obtained from the hospital premises. The concrete blocks are made chiefly by patients.

A new and modern system of electric wiring, lighting, etc., has been installed throughout the hospital buildings, grounds, etc. The wires in the buildings are encased in steel conduits, many of which are concealed in the walls. An excellent gasoline plant is kept in readiness for use should any temporary accident or disability happen to the electric equipment.

The position of special pathologist has been created, and a graduate from the University of Virginia, who has had special laboratory training and experience, will be put in charge June 1. No efforts will be spared to make this department of more practical value to the hospital than heretofore, and it is also the purpose to carry on some experimental work.

An additional stenographer has been employed in order that fuller medical histories may be taken.

The State Board of Charities and Corrections, which was created by the last Legislature, has made regular official visits to the hospital, making a thorough examination into all the details of the institution, care of patients, methods of management, etc. This board, which is a visitorial and advisory body, has already accomplished good work in stimulating more public interest in the hospitals and other institutions throughout the State.

—*Western State Hospital, Staunton.*—At this hospital two wards, to accommodate sixty tuberculous patients, are nearly completed. These are admirably arranged for ventilation and sunshine.

WISCONSIN.—*Milwaukee Hospital for Insane, Wauwatosa.*—Innovations in care and treatment consist of the introduction of the continuous bath and the inauguration of a system of trained nursing for the physically sick and dying, and for the paralytic and bed-ridden. For the short time that the system of trained nursing has been in vogue, it has proven eminently successful and most reassuring to the relatives and friends of the patients so cared for. There are at present in the service four senior nurses from the training school of the Milwaukee County Hospital—one on day and one on night duty in the hospital ward for men, one on night duty in the hospital ward for women, and the fourth substituting for the other three. At present there is no doubt that this service will prove to be invaluable and worthy of further extension, a consummation earnestly hoped for, particularly, in the men's department.

Much has been done in adding to the attractiveness of the grounds surrounding the lake and along the highway. An esplanade made of concrete has been built on the east side of the lake; the balustrades surmounting it have been finished with flower vases on each corner and there is a stairway leading down to the water, making the effect altogether Venetian and forming a most ornamental feature of the lake and its surroundings. A six-foot ornamental stone vase cut out of a solid Bedford stone has been nicely executed by one of the patients and is a most attractive object in the park.

Work is at present in progress on the enlargement of the corridor leading from the administration building to the north wing. The addition to this corridor will be 48 feet long and 16 feet wide, and will be occupied by the steward and accountant in one half and the supervisor of the male wing in the other half. The present office of the steward and accountant will be devoted to the use of the first assistant physician, a much needed arrange-

ment, owing to the large increase of visitors who now have to be accommodated in one office. When this arrangement is completed, all inquiries about women patients will be answered in the new office of the first assistant physician, leaving the present assistant physicians' office to be used for inquiries regarding men patients only. The present supervisor's office will be converted into a toilet room for men. The present officer's dining room will be used as an additional reception room for women visitors, and the serving room off the dining room will be fitted up as a toilet room for women visitors. The entire main hall, including the lobby and two reception rooms, will be paved with encaustic tile.

The Turkish bath rooms will be entirely renovated and the shampooing room will be completely tiled, walls, ceiling, and floor. A fire and water proof asbestos board siding will be placed on the walls of the warm, hot, and cooling rooms.

Much in the way of trees and shrubbery, crushed stone and cement for walks and bridges has been provided for and will be used in further beautifying the park. It is also contemplated at present constructing another lake east of the present lagoon and connected with it by a channel, to be spanned by a concrete bridge. This improvement, if found to be practicable, will add most materially to the attractiveness of the park.

Provision has also been made for the erection of a cooling room for milk at the barn and for the installation of a boiler for the purpose of heating the present barn buildings. Money has also been provided for the purchase and installation of three milking machines. This latter improvement being one of the most important to be made, being far more sanitary than the method in vogue at present, although the entire product of the herd of cows is, and has been, for some time, run through a pasteurizing machine.

WYOMING.—*Wyoming State Hospital for the Insane, Evanston.*—At the recent session of the Legislature an appropriation of $12,000 was made to build a new power house at the Wyoming State Hospital for the Insane, Evanston, Wyo. It is proposed to build the new power house at the foot of the hill fronting the hospital buildings. This will enable all the water of condensation from the heating plant to be returned to the boilers by gravity.

The new $50,000 building for women patients is rapidly approaching completion and will be ready for occupancy by August 1, of this year.

CANADA.—*Protestant Hospital for the Insane, Verdun, Quebec.*—A new brick building, designed to accommodate 150 patients, was begun in September last and is now nearing completion. Much delay has been caused in its being made ready for occupancy by a fire which occurred in it in December, and which destroyed the roof, all the windows, and part of the walls before it could be controlled; the loss is largely covered by insurance. Investigation showed the cause to have been the carelessness of some of the inside workmen engaged in the construction of the building.

Book Reviews.

Neurasthénie et Névroses, leur guérison définitive en cure libre. By Paul-Émile Levy. Alcan, Paris. 1909. 4 fr.

This volume, by the well-known author of the interesting study entitled *L'Education rationnelle de la volonté*, consists of eleven articles, previously published and here reprinted, followed by a general account of psycho-therapy. It is throughout concerned almost entirely with the question of treatment, and the pathogeny and nature of the maladies concerned are only referred to in the most superficial manner. The main thesis of the book, and one that is over and over again repeated from different points of view, is a denunciation of the Weir Mitchell dogma, the belief that isolation, rest and over-feeding are the sovereign remedies to be automatically applied as soon as the diagnosis of neurosis is made. It is sad to think that the unscientific attitude towards the subject represented by that dogma survives so extensively that any one should not only find it necessary to write a book to demolish it, but should even consider himself audacious in having the courage to attack such an established citadel. To any one who still takes the subject seriously this volume can be recommended for its discussion of the disadvantages and defects of the above-mentioned line of treatment. For any one to whom the author's position represents an obvious truism, on the other hand, the volume is not worth reading, for it contains no other substance of any value. Lévy devotes a great deal of the book to inveighing against Dubois, there being an evidently personal note in the tone of his attack, but it is plain that so far as psycho-therapeutic methods are concerned there is but little difference between the views of the two writers.

The so-called rational re-education advocated does not mean, as might have been supposed, a re-education of mental processes along rational lines and based on an exact psychological analysis of the morbid happenings, but a system of arguing with the patient that is entitled "appealing to his reason." The psychology on which this is based is that of the populace at the time of the French Revolution, that "Age of Reason," when the touching belief in the importance of reason as a driving force in the mind of man lasted until its undignified downfall under the wheels of Napoleon's cannon. It is curious how persistently the same attitude has cropped up in France from time to time ever since; we see it at present at the height of its activity in the "persuasive, rational" schools of psycho-therapy represented by Lévy, Babinski, Déjérine, Dubois, etc.

Ernest Jones (Toronto).

Nervous and Mental Diseases. By ARCHIBALD CHURCH, M. D., Professor of Nervous and Mental Diseases and Medical Jurisprudence in the Northwestern University Medical School, etc., Chicago; and FREDERICK PETERSON, M. D., Ex-President of the New York State Commission in Lunacy, Professor of Psychiatry, Columbia University, etc., New York. Sixth edition, thoroughly revised. (Philadelphia and London: W. B. Saunders Company, 1908.)

The sixth edition of this work presents the same general appearance as the preceding ones. Dr. Church has carefully revised his section and has incorporated many additions which bring the subject matter up to date and has increased the whole by twenty pages.

The chapter on Localization in the Cerebral Cortex has been re-written so as to include the results of recent researches.

The paragraph on the treatment of Cerebrospinal Meningitis evidently was written before the use of Flexner's serum achieved such brilliant results.

A new chapter on Psychasthenia has been added and expresses adequately the more recent conceptions of this disease group.

The illustrations, among which several new ones appear, remain as before, valuable, and a pleasing feature of the book. This section as a whole is excellently written and deserves high recommendation as a text-book.

The section on Neurology occupies over two-thirds of the book, and it would be better for the whole if it occupied three-thirds, for Dr. Peterson's section is not by any means up to the same standard. It remains practically the same as in the several preceding editions, with the exception of a new article on Psychotherapy, which in reality is only an inadequate paragraph. The work is still old-fashioned psychiatry, which shows here and there the influence of the author's recent visit to the German clinics. The section can hardly be called revised, as stated in the preface, as the effort to incorporate a little up-to-date psychiatry gives the whole a patch-work and incongruous effect.

The old chapter on Circular Insanity is retained; then follows one on Manic Depressive, which consists of three pages and is mainly a discussion as to the advisability of its admission as a nosographical entity. The old classification, "Primary and Secondary Dementia" and "Acute Curable Dementia," is retained. To the latter a foot-note is added, explaining that "this group of cases has of recent years added to the Dementia Præcox group."

One of the most noticeable things about Dr. Peterson's section is the poor balancing of the various chapters; for instance the one on Dementia Præcox covers only four pages, while the author devotes fifteen to excerpts from an autobiography of a paranoiac.

The short chapter of twelve pages on Paresis remains unchanged, with no reference to some of the recent work done by Robertson and his followers on etiology, and by Wassermann and others on the relation of syphilis

to the disease. No reference is anywhere made to the examination of the cerebrospinal fluid as obtained by lumbar puncture, which procedure is now widely considered to be of great diagnostic value in psychiatry.

Elsewhere small additions have been made in the consideration of alcohol as an etiological factor, in the psychological aspect of memory and in a short notice of the value of the prolonged warm bath in excited cases.

Dr. Meyer's review of the work of Kraepelin, Ziehen and Wernicke, which first appeared in the fourth edition, remains unchanged and stands out by itself in sharp contrast to the quality of the rest of the section.

The lack of any consistent policy of classification on the authors' part, with the maintenance of the old and discarded terms in apparent equal importance with those of modern psychiatry, is very likely to induce an attack of confusion on the part of the student, or at least provoke the exclamation made famous by a confused member of Congress, "where am I at?"

W. B. CORNELL.

Diseases of the Nervous System. By H. CAMPBELL THOMSON, M. D. (Lond.), F. R. P. C. (Chicago: W. T. Keener & Co., 1908.)

This book is divided into six sections, of which the first is introductory and deals with the General Structure of the Nervous System, the Reflexes, Rigidity and Contractures, Electrical Reactions and Lumbar Puncture. Each of these chapters is satisfactory and has been brought up-to-date, epicritic and protopathic sensibility being adequately treated in the first chapter, and the essential points of lumbar puncture in the last. The other sections are devoted to the Peripheral Nerves, the Myopathies (Muscular Dystrophies), Diseases of the Spinal Cord, Organic Diseases of the Brain and Diseases of Functional and General Origin.

In a work of but 480 duodecimo pages it is manifestly impossible to fully cover the entire field of neurology, but the author has given us a book which in brief space treats most clearly of the essential features. To the alienist who has not an active neurological practice, this work offers an excellent opportunity to review the knowledge previously acquired, but perhaps not mentally arranged in an orderly fashion. The work is well illustrated by over one hundred plates, half-tones and line cuts, the most of which are original. Mechanically, the work leaves nothing to be desired.

It must not be understood that the book is without defect, even when it is remembered that completeness has frequently been sacrificed for brevity, but most of these defects are of omission rather than commission and are, therefore, more excusable. In discussing the mental symptoms of multiple neuritis the following occurs: "Emotional tendencies, untruthfulness, indecision, mental confusion, with loss of memory for recent events and loss of ideas of space and time—symptoms which are grouped under the heading of Korsakow's psychosis—are generally met with in some degree, while in the more severe cases, hallucinations, delirium tremens or insanity may be present. Alienists generally believe that Korsakow's psychosis

should be grouped among the insanities, just as are most psychoses, and when delirium tremens is found associated with multiple neuritis it is merely because they have a common cause and not because of any special relationship between them." This paragraph does not seem quite clear to the reviewer and we fear may be misleading to the student. The relationship between tabes and paresis is disposed of in the following parenthetical statement in a paragraph speaking of the work of Ford Robertson: (for the nature of the pathology of both is probably identical), and no mention of tabo-paresis is made. While lymphocytosis is mentioned under lumbar puncture as occurring in paresis, it is not mentioned at all under the section treating of that disease, although such procedure would be of value in differentiating paresis from neurasthenia, disseminated sclerosis, chronic alcoholism and frontal tumor, which with syphilitic affections of the brain are enumerated under diagnosis. Under epilepsy there is no adequate description of the various forms, neither Jacksonian nor psychic epilepsy being noted. The former, however, is mentioned under intracranial tumors, but the latter is nowhere described. The above are samples of a few of the defects, but in spite of them the book is a good one and deserves success. W. R. D.

Abstracts and Extracts.

The Experimental Study of the Ocular Reactions of the Insane from Photographic Records. By Allen Ross Diefendorf and Raymond Dodge. Brain, Vol. XXXI, Part CXXIII, 1908, pp. 451-489.

This study—perhaps the most important single contribution that psychiatry has yet derived from the methods of experimental psychology—deals with a type of reaction that from a wholly analytical standpoint one would expect to possess many clinical possibilities. The eye movements unite extreme delicacy of response with close association with the highest mental functions, and peculiar inaccessibility to introspection. As the authors point out, this last consideration, combined with the involuntary character of the eye movements, is also an effective check on simulation. Moreover, since the eye movements are among the most universally developed of reactions, there is probably no accessible motor function in which practice is so nearly equal for different individuals. Altogether, if we except certain special features of the vasomotor responses, there is probably no form of reaction in which we should expect mental disorder to be more objectively revealed than in the eye movements. Their nearest competitors in this field are the speech and writing movements, and both of these have figured somewhat in the study of deranged mental reactions; but they yield to the eye movements on practically every point.

Three aspects of oculomotor activity are considered: 1st, the velocity of the eye movements, *i. e.*, the actual speed with which the eye moves from one to a second point of regard; 2d, the reaction time of the eye, *i. e.*, the time required for the eye to begin to move in response to a given visual stimulus, and 3d, the pursuit movements, the ability to follow a fixation point on a moving pendulum. The number of subjects, which totals over fifty, would seem to be in each group sufficient for significance in the special results that are claimed for them. The essential interest of the data, however, centers in the manic-depressive conditions for the velocities and the reaction times, and in the dementia præcox cases for the pursuit movements. Adequate normal data are presented for comparison.

It seems comparatively certain that the angular velocity of eye movements is in the manic state slightly greater than in the normal state, and within groups, the more marked excitements have the faster rates, though of course there is no high individual correlation. This the authors interpret, according to the usual point of view, as the result of the loss of inhibitory power by the higher centers in the manic state. On the other hand, the movements of the depressed cases, which are considerably slower

than the normal, seem rather to be the "expression of a more widespread involvement resulting in a general inefficiency of the whole psychomotor system, and including not only the higher centers, which appear to be chiefly involved in mania, but also the lower centers, the simple reflexes, and automatic acts."

The reaction test consisted in the determination of the time which the eye took to move to fixate a figure exposed one inch to the right or left of a given fixation. There is a little confusion of terminology here. The process is one which has always borne, and will probably continue to bear the name of "choice reaction," involving the choice between movements, as in this case, to right or left. The *simple* reaction, in the ordinary psychological acceptation of the term, is not, as the authors point out, typical of ocular reactions, and the term should hardly have been used in this connection. 200 sigma is by no means long for any choice time.

These reaction times are shortest in the normal, slightly longer in the manic, and very much longer in the depressed. No interpretation of these results is offered, and it may be said that the analysis of the results as related to the clinical pictures leaves much to be desired. It is interesting to remark, however, that the depressed patients are, relatively to the normal and manic states, very much slower both here and in the pursuit reactions than in the velocity measurements, *i. e.*, the retardation given in this loss of motor efficiency is most conspicuous in the *initiation* of a reactive movement. It will be remembered that Hoch came some years ago to a similar conclusion from the ergograph. The paper's fundamental conception of manic-depressive insanity seems, however, to be a hypothesis derived rather from psychological deduction than clinical observation.

The pendulum pursuit is another type of reactive movement, the subject being required to follow a figure attached to the bob of a pendulum, and the quantity measured being the time elapsing between the starting of the pendulum, and the following movement of the eye. The psychological implications of this reaction may be quoted as follows:

". . . . The psychomotor elaboration of the simple ocular reaction is fixed by the long-established habit of bringing excitations of the peripheral retina to areas of clear vision. The psychomotor elaboration of the pursuit movements on the other hand, is in practically each instance the pursuit of a unique psychomotor problem. . . . . Yet unique as each case actually is, a normal eye will fall into an adequate pursuit movement with surprising quickness and accuracy . . . . this ability to elaborate adequate pursuit movements, *i. e.*, to adopt an adequate motor response to the peculiar situation presented by the rhythmic movements of an object, varies widely in mental disease. In some respects, the most marked variations are found in the pendulum pursuit movements of dementia præcox, *where a marked hesitation to fall into the swing of the pendulum was found even in the mildest case.** While this peculiarity is apparently not absolutely re-

* The italics are mine.—F. L. W.

stricted to dementia præcox, it was found in other patients only when the disease process had produced a marked deterioration."

This difficulty of adopting adequate reactions to new conditions of the environment, as given in the failure to get the pursuit movements promptly, and to preserve them when attained, the authors offer as a contributory diagnostic sign for dementia præcox. These anomalies in the pursuit movements are not readily observed directly, though they are clear-cut enough in the photographic records. The line traced by the movement of the eye has a peculiar stair-shaped form, quite distinct from the more even forms seen elsewhere, save in the gross disorganizations of other and more profound dementias. Certain it is if the curves reproduced on page 474 are typical, an important diagnostic sign for dementia præcox is indicated, and there can be little question that the experiments justify early and extensive repetition. F. L. WELLS.

The Development of the Legal Relations Concerning the Insane, with Suggestions for Reform. By ALLAN MCLANE HAMILTON, M. D. Medical Record, Vol. 74, p. 782, November 7, 1908.

This is a paper which will well pay perusal. It is impossible to do it justice in an abstract, and the author's conclusions are, therefore, submitted, as they are recommendations which will appeal to all interested in the care of the insane. They are:

"1. There should be obligatory information of the commissioner of lunacy in regard to the existence of all cases of insanity.

"2. Though the commissioner of lunacy may have power to license private institutions, he should also be empowered to formulate additional requirements which would put some of them on a much higher standard than they occupy at present.

"3. Commitments are chiefly to be looked upon as reinforcement by the judge of the persuasions exerted by the friends, physician and family of the patient, and should be resorted to only when the latter cannot be persuaded to go to the asylum.

"4. Everything should be done to make the appeals of committed patients available. There should be severe punishment for the suppression of letters, or the interference in any way with the alleged lunatic's rights.

"5. There should be material reform in the attitude of the law regarding capacity and criminal responsibility, insane acts in themselves, in any relation they may have, receiving more weight than heretofore.

"6. There should be a departure from conventions in old and arbitrary definitions.

"7. Special insane acts should be studied with reference to the crime itself in a way they have not been up to this time.

"8. The attitude of the courts should be much more charitable to the medical witness than it is to-day, the intelligent medical man being put in

possession of all the facts in the case and not being obliged to answer restricted questions which place him in a false position, and which are deficient in the presentation of the facts.

"9. In all matters involving the determination of capacity or responsibility the medical man should be required to prepare a brief, which should form the basis of his cross-examination, and this, if necessary, must be supported by extraneous evidence which has received the sanction of the court as to heredity, previous history and facts communcated by others."

W. R. D.

Contributo all'eziologia della demenza precoce. Per Dott Virginio Steiner. Giornale di psichiatria clinica et tecnica manicomiale, Anno XXXVI, 1908, p. 156.

The author has made a careful study of his subject and begins his paper by a number of references to other writers, especially accentuating in this investigation the subject of hereditary transmission of morbid characteristics.

The subjects of the investigation were 190 patients at the asylum of Mendrisio, in Switzerland, of whom 112 were men, and 78 women. Of these, 57, or 30 per cent, were hebephrenics; 60, or 31.6 per cent, were catatonics; and 73, or 38.4 per cent were of the paranoid form. It would expand this abstract beyond proper limits to reproduce all of the interesting tables in this article, but it may be said that 123 patients showed a positive heredity; 29 a negative; and 38, or 20 per cent, had doubtful histories.

The author's conclusions are summed up as follows:

"1. Cases of dementia præcox represent 13.8 per cent of all the insane admitted to the cantonal asylum of Mendrisio.

"2. Generally, heredity from the father is more marked in the men, and maternal heredity more in the women.

"3. In 64.7 per cent of the cases of dementia præcox there is an hereditary defect either in the direct or indirect and collateral line, or in the family disposition.

"4. The larger percentage is that of the direct heredity with 62.6 per cent, followed by the atavistic and collateral, together making 13.8 per cent.

"5. As to hereditary factors, mental alienation takes first place with 60.9 per cent; coming next in order of frequency are alcoholism, nervous diseases and finally suicide.

"6. Of the three forms, paranoid dementia gives the larger percentage, or 38.4 per cent; the catatonic 31.6 per cent; and the hebephrenic 30 per cent.

"7. Much more striking is the disease heredity with 43.9 per cent in the paranoid form, the men being in the majority. The catatonic has 28.4 per cent and the hebephrenic 27.6 per cent. Negative heredity is least in the paranoid form and most frequent in the catatonic.

"8. Insanity as an hereditary factor is shown in the hebephrenic form in 76.4 per cent; in the catatonic in 65.7 per cent, and in the paranoid in 48.1 per cent.

"9. Alcoholism as a hereditary factor holds first place in the paranoid form with 25.9 per cent.

"10. Direct heredity is less in the paranoid form than in the other two, while the collateral and atavistic has a higher percentage in the paranoid form than in the other two.

"11. There appears to be an evident relationship between the form of the disease and the hereditary factors, excepting perhaps alcoholism, which is met with in marked preponderance in the paranoid variety."

W. R. D.

Appointments, Resignations, Etc.

AITKEN, DR. C. STANLEY, Clinical Assistant at Philadelphia Hospital for the Insane at Philadelphia, Pa., appointed Fourth Assistant Physician at State Hospital for the Insane at Norristown, Pa.

ASHE, DR. EARL, appointed Pathologist at State Hospital for the Insane at Norristown, Pa.

AYDELOTTE, DR. JOHN THOMAS, appointed Assistant Physician at Philadelphia Hospital for the Insane at Philadelphia, Pa., September 16, 1908.

AYER, DR. JAMES B., JR., Assistant Pathologist at Danvers Insane Hospital at Danvers, Mass., resigned.

BARNARD, DR. ESTHER S., appointed Junior Assistant Physician at Westborough Insane Hospital at Westborough, Mass.

BASS, DR. HERSCHEL W., appointed Assistant Physician at Bryce Hospital at Tuscaloosa, Ala.

BATTE, DR. JOHN, appointed Assistant Superintendent at Longview Hospital at Carthage, O.

BEEMER, DR. FRANK, Assistant Physician at Hospital for the Insane at Hamilton, Ont., for twenty years, resigned.

BELL, DR. CLARENCE R., Medical Interne at Government Hospital for the Insane at Washington, D. C., resigned November 30, 1908, to become Assistant Physician at Illinois General Hospital for the Insane at Peoria, Ill.

BENDER, DR. W. E., formerly Second Assistant Physician at Eastern Kentucky Asylum for the Insane at Lexington, appointed to a similar position at Western Kentucky Asylum for the Insane at Hopkinsville.

BOND, DR. EARL D., Junior Assistant Physician at McLean Hospital at Waverly, Mass., promoted to be Second Assistant Physician November 13, 1908.

BRADLEY, DR. ISABEL A., Woman Physician at Columbus State Hospital at Columbus, resigned and appointed Woman Physician at Friends Asylum at Frankford, Pa.

BROOKS, DR. HENRY J., formerly Superintendent of Illinois Northern Hospital for the Insane at Elgin, died at his home in Dixon, February 25, 1909, of cerebral hemorrhage, aged 59.

BROWER, DR. DANIEL ROBERTS, formerly Superintendent of Eastern State Hospital at Williamsburg, Va., died of cerebral hemorrhage at his home in Chicago, March 1, 1909, aged 69.

BROWN, DR. JOHN PEASLEE, formerly Superintendent of State Hospital for the Insane at Taunton, Mass., for twenty-six years, died from acute bronchitis, September 19, 1908, at the home of his daughter in Springfield, Mass., aged 74.

BROWN, DR. LOUIS R., appointed Junior Assistant Physician at Connecticut Hospital for the Insane at Middletown, January 1, 1909.

BROWNE, DR. JUDSON F., appointed Medical Interne at Gowanda State Hospital at Gowanda, N. Y.

BUHRMAN, DR. E. R., Second Assistant Physician at Westborough Insane Hospital at Westborough, Mass., resigned April, 1908, on account of ill health.

BULLARD, DR. ERNEST L., formerly Superintendent of State Hospital for the Insane at Milwaukee, Wis., has removed to Rockville, Md., where he has organized the Chestnut Lodge Sanitarium which will open May 1, 1909.

BULLARD, DR. IRENE, Assistant Physician at Eastern State Hospital at Williamsburg, Va., resigned.

BURLINGAME, DR. C. C., appointed Junior Assistant Physician at Westborough Insane Hospital at Westborough, Mass., July 1, 1908.

CADY, DR. FREDERIC B. M., Junior Assistant Physician at McLean Hospital at Waverly, Mass., resigned to enter private practice, November 5, 1908.

CALHOUN, DR. JOHN C., Medical Interne at Buffalo State Hospital at Buffalo, N. Y., promoted to be Junior Assistant Physician, October 31, 1908.

CAMPBELL, DR. DANIEL A., appointed First Assistant Physician at Western Kentucky Asylum for Insane at Hopkinsville.

CLARKE, DR. CHAS. K., appointed Dean of the medical faculty of Toronto University.

CLEMENTS, DR. HARVEY J., appointed Assistant Physician at Oregon State Insane Asylum at Salem.

COLE, DR. CHARLES H., Special Medical Attendant at Manhattan State Hospital at Ward's Island, N. Y., resigned January 15, 1909.

CONNEFFE, DR. JAMES, appointed First Assistant Physician at Columbus State Hospital at Columbus, O., January 1, 1909.

CROCKETT, DR. HENRY STUART, formerly Assistant Physician at Western State Hospital at Staunton, Va., died September 8, 1908, aged 61.

DE SHONG, DR. G. W., First Assistant Physician at Norfolk State Hospital for the Insane at Norfolk, Neb., resigned February 1, 1909.

DIETZ, DR. WILLIAM, Assistant Physician at Eastern Washington Hospital for the Insane at Medical Lake, resigned on account of ill health.

DRENNAN, DR. LAWRENCE M., Special Attendant at Government State Hospital at Washington, D. C., resigned March 2, 1909, with the expectation of entering the medical service of the United States Army.

ECKEL, DR. JOHN L., Junior Assistant Physician at Central Islip State Hospital at Central Islip, L. I., transferred to Buffalo State Hospital at Buffalo, N. Y., January 4, 1909.

FARNELL, DR. FREDERIC J., appointed Medical Interne at Manhattan State Hospital at Ward's Island, N. Y., December 2, 1908.

FERNALD, DR. GUY G., Second Assistant Physician at McLean Hospital at Waverly, Mass., resigned to be Physician to Massachusetts Reformatory, November 13, 1908.

FETTER, DR. S. P., Assistant Physician at Ohio Hospital for Epileptics at Gallipolis, resigned to enter private practice at Portsmouth, O.

FITCH, DR. ARTHUR C., Junior Assistant Physician at Government Hospital for the Insane at Washington, D. C., resigned January 31, 1909, to enter the medical service of the Maderia-Mamore Railway Company with headquarters at Porto Velho, Brazil.

FITZGERALD, DR. JOHN G., Clinical Director at Hospital for the Insane at Toronto, Ont., resigned to do special research work at Harvard Medical School.

FLINN, DR. GEO. W., appointed Assistant Physician at St. Louis Asylum at St. Louis, Miss.

FOLIN, DR. OTTO G., Assistant in Pathological Chemistry at McLean Hospital at Waverly, Mass., resigned to give his entire service to the Harvard Medical School, October 31, 1908.

FREED, DR., Assistant Physician at Western State Hospital at Staunton, Va., resigned February, 1909, to enter private practice.

GALBREATH, DR. DOUGLAS J., Assistant Physician at Toronto Hospital for the Insane, transferred to Protestant Hospital for the Insane at Verdun, Quebec.

GARTEN, DR. FRANK, Medical Interne at Willard State Hospital at Willard, N. Y., resigned November, 1908, to enter private practice.

GARVIN, DR. WILLIAM C., Junior Physician at Manhattan State Hospital at Ward's Island, N. Y., promoted to be Assistant Physician, October 1, 1908.

GAVER, DR. EARL E., First Assistant Physician at Columbus State Hospital at Columbus, O., resigned January 1, 1909, to open a sanitarium in Columbus for the treatment of mental and nervous diseases.

GEHRINGER, DR. GEORGE M., Medical Interne at Government Hospital for the Insane at Washington, D. C., resigned January 31, 1909, to become Assistant Physician at Flushing Hospital at Flushing, Long Island.

GOODBRED, DR. ROBERT L., Chief Physician at Hospital for the Insane at Tallahassee, Fla., resigned.

GREENE, DR. M. K., First Assistant Physician at State Hospital for the Insane at Mendota, Wis., has been placed temporarily in charge of the State Tuberculosis Sanitarium at Wales.

GRUESSNER, DR. ANTHONY, Medical Interne at Craig Colony at Sonyea, N. Y., resigned February 15, 1909, to enter private practice.

GUTTERY, DR. W. D., appointed First Assistant Physician at Norfolk State Hospital at Norfolk, Neb., February 1, 1909.

HALL, DR. ELMO ALLEN, formerly Superintendent of State Hospital for the Insane at Evanston, Wyo., died at Mayer, Ariz., February 1, 1909, aged 30.

HAMBROOK, DR. A. J., Medical Interne at Willard State Hospital at Willard, N. Y., resigned November, 1908, to enter private practice.

HANSON, DR. JAMES T., Superintendent of Athens State Hospital at Athens, O., resigned.

HAVILAND, DR. FRANK R., Junior Physician at Manhattan State Hospital at Ward's Island, N. Y., promoted to be Assistant Physician October 1, 1909.

HAZLEWOOD, DR. JAMES F., Medical Interne at Buffalo State Hospital at Buffalo, N. Y., resigned December 31, 1908, to enter service of Methodist Episcopal Hospital at Brooklyn, N. Y.

HOWARD, DR. BURT F., Assistant Physician at State Hospital at Tewksbury, Mass., resigned to take a position in a private sanitarium at Livermore, Cal.

JACKSON, DR. JAMES ALLEN, appointed Clinical Assistant at Philadelphia Hospital for the Insane at Philadelphia, Pa., July 8, 1908, and resigned to be Assistant Physician at Central Indiana Hospital for the Insane at Indianapolis, August 15, 1908.

JOHNSON, DR. MARY, Assistant Physician at Westborough Insane Hospital at Westborough, Mass., resigned.

JONES, DR. ERNEST, appointed Pathologist at Hospital for the Insane at Toronto, Ont.

JORDAN, DR. M. M., Third Assistant Physician at Westborough Insane Hospital at Westborough, Mass., promoted to be Second Assistant.

KELL, DR. RALPH C., Junior Assistant Physician at McLean Hospital at Waverly, Mass., resigned to be Second Assistant Physician at Worcester State Asylum at Worcester, Mass., June 30, 1908.

KELLER, DR. CORLIES, Assistant Superintendent at Longview Hospital at Carthage, O., resigned.

KING, DR. J. C., appointed Superintendent of Southwestern State Hospital for Insane at Marion, Va.

KING, DR. ROBERT, Assistant Physician at Protestant Hospital for the Insane at Verdun, Quebec, resigned to take a position at St. Lawrence State Hospital at Ogdensburg, N. Y.

LEAVITT, DR. WILLIAM, appointed Medical Interne at Craig Colony at Sonyea, N. Y., February 15, 1909.

LONG, DR. T. W. M., appointed Fourth Assistant Physician at Central State Hospital at Petersburg, Va.

LORENZ, DR. WILLIAM F., Junior Physician at Manhattan State Hospital at Ward's Island, N. Y., promoted to be Assistant Physician, October 1, 1909.

MCCAFFERTY, DR. GEORGE W., Assistant Physician at State Hospital for the Insane at Norristown, Pa., appointed Assistant Physician at Pennsylvania Hospital for the Insane at Philadelphia, Pa., October 1, 1908.

MCLEISH, DR. JOHN, Assistant Physician at Athens State Hospital at Athens, O., resigned.

MACDONALD, DR. THOMAS D., Junior Physician at Manhattan State Hospital at Ward's Island, N. Y., promoted to be Assistant Physician, December 1, 1908.

MACK, DR. CLIFFORD W., appointed Assistant Physician at Eastern Michigan Asylum at Pontiac.

MILLS, DR. ORIN S., Assistant Physician at Columbus State Hospital for the Insane at Columbus, O., died in Gallipolis, O., November 24, 1908, from a gunshot wound of the head said to have been self inflicted, aged 48.

MITCHELL, DR. GEO. W., First Assistant Physician at Illinois General Hospital for Insane at Peoria, has been attending the Psychiatric clinics in Vienna and is expected to return to his duties soon.

MOORE, DR. CLARA M., appointed Woman Physician at State Hospital for the Insane at Pueblo, Col.

MORRISON, DR. J. FRANK, Junior Assistant Physician at Connecticut Hospital for the Insane at Middletown, resigned September 12, 1908, to enter private practice.

MURRAY, DR. M. FOSTER, appointed Medical Interne at Matteawan State Hospital at Fishkill-on-Hudson, N. Y., June, 1908.

NEAL, DR. THOMAS F., Superintendent of Blair County Hospital for the Insane at Hollidaysburg, Pa., resigned.

NICKERSON, DR. MARY A., Medical Interne at Rochester State Hospital at Rochester, N. Y., promoted to be Junior Physician.

NUNEMAKER, DR. HENRY B., Assistant Physician at Pennsylvania Hospital for the Insane at Philadelphia, Pa., for twenty-nine years, resigned October 1, 1908.

OLIVER, DR. A. S., appointed Assistant Physician at Eastern Washington Hospital for the Insane at Medical Lake.

OSBORN, DR. FRANK E., Superintendent at State Institution for Feeble-minded at Beatrice, Neb., resigned.

PARKER, DR. REA, at one time Druggist at Central State Hospital at Petersburg, Va., appointed Second Assistant Physician at the same.

PEASE, DR. EDMUND D., appointed Junior Assistant Physician at McLean Hospital at Waverly, Mass., October 31, 1908.

PECIVAL, DR. J. P., appointed Superintendent of Norfolk State Hospital at Norfolk, Neb., February 1, 1909.

PECK, DR. ELLERY N., appointed Special Medical Attendant at Manhattan State Hospital at Ward's Island, N. Y., December 16, 1908.

PERKINS, DR. ANNE E., Medical Interne at Gowanda State Hospital at Gowanda, N. Y., promoted to be Woman Physician.

PERSHING, DR. CYRUS L., Medical Interne at Manhattan State Hospital at Ward's Island, N. Y., resigned January 1, 1909.

PETERY, DR. ARTHUR K., appointed Fifth Assistant Physician at State Hospital for the Insane at Norristown, Pa.

PIERSON, DR. SARAH A., Medical Interne at Rochester State Hospital at Rochester, N. Y., promoted to be Junior Physician.

PRESTON, DR. JOHN, Superintendent of State Epileptic Colony at Abilene, Texas, appointed Superintendent of State Lunatic Asylum at Austin, Texas, January 1, 1909.

PRIDDY, DR. ALBERT S., Superintendent of Southwestern State Hospital at Marion, Va., resigned.

RAINES, HON. GEO., President of the Board of Managers of the Rochester State Hospital at Rochester, N. Y., and one of its original members, died October, 1908.

RANDOLPH, DR. JAMES H., Assistant Physician at Hospital for the Insane at Tallahassee, Fla., promoted to be Chief Physician.

READ, DR. CHAS. F., appointed Assistant Physician at Illinois Eastern Hospital for the Insane at Hospital.

REED, DR. STEPHEN J. H., Medical Interne at Manhattan State Hospital at Ward's Island, N. Y., resigned October 21, 1908.

REID, DR. EVA, appointed Medical Interne at Government Hospital for the Insane at Washington, D. C.

RINDE, DR. HAMILTON, appointed Junior Assistant Physician at Connecticut State Hospital at Middletown, September 30, 1908.

ROBENSON, DR. ROY, appointed Third Assistant Physician at Western Kentucky Asylum for the Insane at Hopkinsville.

RORICK, DR. E. H., appointed Superintendent of Athens State Hospital for the Insane at Athens, O.

ROW, DR. G. L., appointed Superintendent of State Institution for Feeble-minded at Beatrice, Neb.

SCHAIBLE, FRANK G., Clinical Laboratory Assistant at Manhattan State Hospital at Ward's Island, N. Y., resigned October 6, 1908.

SCHNEIDER, DR. CARL VON A., Junior Physician at Gowanda State Hospital at Gowanda, N. Y., promoted to be Assistant Physician.

SIDWELL, DR. L. T., appointed Medical Interne at Iowa Institution for Feeble-minded at Glenwood.

SMITH, DR. A. L., Junior Physician at Utica State Hospital at Utica, N. Y., resigned November 15, 1908, to be Assistant Surgeon at Soldiers and Sailors Home at Bath, N. Y.

SMITH, DR. WILLIAM A., Junior Physician at Willard State Hospital at Willard, N. Y., has been attending a special course in pathology at the Psychiatric Institute since January 1, 1909, and will resume his duties April 1, 1909.

SOMMER, DR. HENRY J., Pathologist at State Hospital for the Insane at Norristown, Pa., resigned to be Superintendent of Blair County Hospital for the Insane at Hollidaysburg, Pa.

SOPER, DR. ARTHUR E., appointed Medical Interne at Manhattan State Hospital at Ward's Island, N. Y., March 8, 1909.

SPENCE, DR. H. D. L., Medical Interne at Utica State Hospital at Utica, N. Y., promoted to be Junior Physician, November 25, 1908.

STACY, DR. GEORGE, appointed Pathologist at Illinois Central Hospital for the Insane at Jacksonville.

STEPHENS, DR. G. W., appointed Pathologist and Second Assistant Physician with immediate charge of the infirmary at East Mississippi Insane Hospital at Meridian, Miss.

STEPHENSON, DR. JUNIUS N., appointed First Assistant Physician at Southwestern State Hospital at Marion, Va.

STILES, DR. HENRY REED, formerly Superintendent of Middletown State Homeopathic Hospital at Middletown, N. Y., died at his home in Hillview, N. Y., of cerebral hemorrhage, aged 76.

STRICKLER, DR. EDWARD J., appointed Clinical Assistant at Manhattan State Hospital at Ward's Island, N. Y., February 2, 1909.

TURNER, DR. JOHN F., Assistant Superintendent at Asylum for Insane Indians at Canton, S. Dak., resigned to enter private practice in Canton.

WADE, DR. J. PERCY, Superintendent of Maryland Hospital for the Insane at Catonsville, sailed for Europe January 23, 1909.

WARNER, DR. LUCY M., Assistant Physician at Wisconsin Northern Hospital for the Insane at Winnebago, died suddenly at that institution from heart disease November 11, 1908, aged 26.

WEBER, DR. KENNETH L., appointed Assistant Physician at State Hospital for the Insane at Athens, O.

WIDDOP, DR. MARY E., Assistant Physician at Northern Hospital for the Insane at Logansport, Ind., is in Rochester, Minn., for operation for chronic gastric ulcer.

WILSON, DR. W. T., Assistant Superintendent of Toronto Hospital for Insane at Toronto, Ont., appointed Superintendent of Asylum for the Insane at Cobourg, Ont.

WOODRUFF, DR. JOHN H., appointed Medical Interne at Manhattan State Hospital at Ward's Island, N. Y., January 2, 1909.

WORSHAM, DR. B. M., Superintendent of State Lunatic Asylum at Austin, Texas, resigned January 1, 1909, to enter private practice in El Paso, Texas.

WRIGHT, DR. HAROLD W., Junior Physician at Manhattan State Hospital at Ward's Island, N. Y., promoted to be Assistant Physician, October 1, 1908, and transferred to New York State Hospital for Crippled Children November 4, 1908.

YOUNG, DR. G. A., Superintendent of Norfolk State Hospital at Norfolk, Neb., resigned February 1, 1909.

ZELLER, DR. GEORGE A., Superintendent of Illinois General Hospital for Insane at Peoria, returned March 1, 1909, from a two months trip to Europe.

Pamphlets Received.

The Broader Aims of the Council of Pharmacy and Chemistry of the American Medical Association. By Torald Sollmann, M. D., Cleveland, Ohio.

Venesection and Cardiovascular Affections. Judson Daland, M. D. Reprint from Journal of the American Medical Association, Vol. LI.

Myotonia. By Edwin A. Down, M. D., Hartford, Conn.

Improvement and Deterioration. By J. T. Searcy, Tuscaloosa, Ala.

Splenectomy. By Geo. Ben Johnston, M. D. Reprint from Annals of Surgery, July, 1908.

The Cerebral Centers for Taste and Smell and the Uncinate Group of Fits. By Chas. K. Mills, M. D. Reprint from Journal of the American Medical Association, September 12, 1908, Vol. LI.

Psychotherapy: Its Scope and Limitations. By Chas. K. Mills, M. D. Reprint from Monthly Cyclopedia and Medical Bulletin, July, 1908.

Puo l'eritrma nodoso, in soggetto affetto da tisi, comparire a causa di una violenta emozione? Estratto dal Giornale Medico Il Cesalpino N. 12, Arezzo, December, 1908.

Economic Aspect of Lengthening Human Life. By Prof. Irving Fisher. Address delivered before the Association of Life Insurance Presidents, N. Y., February 5, 1909.

Central Neuritis. By Dr. E. M. Somers, N. Y. Reprint from State Hospital Bulletin, December, 1908.

Bismuth Paste in the Treatment of Suppuration of the Ear, Nose and Throat. Joseph C. Beck, M. D. Reprint, with additions, from Journal of the American Medical Association, January 9, 1909, Vol. LII.

Toxic Effects from Bismuth Subnitrate. By Emil G. Beck, M. D., Chicago. Reprint from New York Medical Journal, January 2, 1909.

On the Use of the Wax-Tipped Catheter for Diagnosis of Kidney Stone in the Male. By Winfield Ayres, M. D. Reprint from American Journal of Surgery, November, 1908.

Transitory Disturbances of Consciousness in Epileptics. By S. P. Goodhart, M. D. Reprint from American Medicine, Vol. III, September, 1908.

The Meniere Symptom-Complex. By S. P. Goodhart, Ph. B., M. D. Reprint from Medical Review of Reviews, N. Y., July, 1908.

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VOL. LXV No. 1

SEP

THE AMERICAN JOURNAL OF INSANITY

UNDER THE AUSPICES OF
THE AMERICAN MEDICO-PSYCHOLOGICAL ASSOCIATION

EDITORS
Henry M. Hurd, M. D. G. Alder Blumer, M. D.
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BALTIMORE
THE JOHNS HOPKINS PRESS
JULY, 1908

EDINBURGH
JOHN F. MACKENZIE
11 Teviot Place

Entered as Second-Class Matter at the Baltimore, Maryland, Postoffice.

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The volumes begin with the July number. The subscription price is five dollars for the yearly volume, payable in advance. The journal is published quarterly.

Subscriptions and remittances should be sent to

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